

THE PHYSICAL STATUS OF PSYCHIATRIC PATIENTS

IN GENERAL PRACTICE

by

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SUMMARY

The aim of this study was to examine the relationship between psychiatric and physical morbidity. An extensive review of the literature has shown that previous research in this area has suggested that there was a positive association between the two types of morbidity, but the results were not always consistent and some studies had not demonstrated this relationship. It was considered that the reason for the inconsistency in the previous work was possibly due to biases, such as different patterns of consultation and presentation of symptoms, different diagnostic habits and methods of record-keeping by the medical practitioners, different techniques for case-identification and data collection by the research workers and different systems of measurement for the types of morbidity. It was thought that any true association between psychiatric and physical morbidity could only be properly demonstrated by minimising or eliminating the potential bias.

The hypothetical association was therefore examined on a randomly chosen sample of the general population at a health screening survey. Using screening techniques, a psychiatric sample was obtained from this population and matched with a psychiatrically normal control group on the demographic variables of age, sex, marital status and Registrar General's Classification of Social Class. Physical illness was diagnosed by means of objective measurements and clinical examination independent of the medical records and largely independent of statements made by the patients.

The psychiatric sample was selected using an initial

screening instrument consisting of twenty questions from the Cornell Medical Index Health Questionnaire. The items had previously been shown to discriminate between those with and without a psychiatric disorder in a general practice population. Persons scoring above a set threshold of positive responses to these items, were regarded as potential psychiatric cases; persons scoring nought were regarded as potentially psychiatrically normal, and therefore possible control cases. The presence or absence of psychiatric morbidity was confirmed in every case, by the author, using a clinical interview schedule of known reliability. 369 clinical interviews were carried out to obtain the psychiatric Index and Control cases. Since the initial screening instrument produced both false-positive and false-negative cases the number of actual Index and Control cases was reduced. A central feature of the design was the matching procedure, which was used to produce psychiatric and control samples equivalent in demographic terms. Strict application of the matching meant that a small proportion of the Index cases, mainly widows and divorcees, could not be controlled with suitable psychiatrically normal people. This resulted in a wastage of Index cases and also some Control cases, since the latter had no Index cases with whom they could be matched. The final number of matched pairs was 124. The ratio of female to male cases was greater than two to one. This is a familiar finding in psychiatric community studies.

A 70% response rate was obtained on the population eligible for screening, which compared favourably with other screening surveys. It was a fairly homogeneous group of people

with the larger proportion married and of the skilled artisan class. All were between the ages of 40 to 64 years inclusive.

Although the primary concern of this study was not with psychiatric screening, examination of the literature on previous health screening surveys, suggested that this was a very comprehensive application of psychiatric methodology to screening. Whereas the more usual practice had been to add psychiatric items to a health questionnaire, this survey appeared to be unique in having a psychiatrist, the author, present throughout the screening survey. It was considered that although psychiatric morbidity constituted a considerable public health problem, the application of strict criteria to the concept of psychiatric screening indicated that, for the present, it should remain at the experimental stage rather than proceed to wide-spread application.

The psychiatric cases identified in this survey were largely the minor neurotic disorders commonly found in general practice, but a proportion of the cases were of moderate severity. The males had significantly more personality disorders and there was a trend for the females to have more hypochondriacal neuroses. Significant differences were also shown, for sex and age, on the symptom profiles derived from the clinical interview schedule. A proportion of the male and female psychiatric cases, identified by the author at the screening survey, were not recognised as suffering from a psychiatric disorder by the general practitioners. However, some of these cases had been recognised by the general practitioners in the past. Those unrecognised tended to have milder conditions, of shorter

duration, with less formal psychiatric treatment and lower consultation rates in the past, than those recognised by the general practitioners.

For the purposes of comparison, the physical conditions were operationally divided into major and minor disorders. Furthermore those conditions, traditionally regarded as being psychosomatic, as well as being used in the main comparisons, were compared separately as major and minor psychosomatic disorders.

The male Index cases had a significantly greater average number of major physical conditions, major psychosomatic conditions and minor physical conditions, than the Control cases. No differences were found for minor psychosomatic conditions. The female Index cases had a significantly greater average number of major physical conditions and major psychosomatic conditions but not minor physical conditions and minor psychosomatic conditions, than the Control cases. The differences for major physical disease, between the Index and Control groups, were greatest in the 53-64 age range. A comparison, between the Index and Control groups, for the numbers totally free from both major and minor physical disease, showed that the Control group had significantly more persons with no physical disease.

Both male and female Index cases had, on average, a significant excess of major cardiovascular and coronary heart disease when compared with the Control cases. The male Index cases had significantly more minor cardiovascular disease than the male Control cases. Non-significant differences were found

for those with coronary heart disease, compared with the others in the Index and Control samples, on such variables as smoking habits, measures of obesity, blood pressure readings and blood cholesterol, uric acid and urea. In respect of respiratory disease, significant differences, between Index and Control groups, were shown for symptoms but not for objective measurements of ventilatory capacity. No significant differences were found for smoking habits.

It was shown that the differences between the Index and Control groups lay in those patients with multiple physical disorders (two major plus minor physical conditions) and in those totally free from physical disease. There was a tendency for the number of conditions per individual to increase with age, but this occurred to a significantly greater extent in the Index group. Those with multiple physical disorders, both in the Index and Control groups, were significantly older than the remaining members of the samples. The Index cases, with multiple physical disorders, had a mean psychiatric severity score significantly greater than the mean for the rest of the Index sample. No significant differences were found in respect of other variables, such as duration of psychiatric illness and consultation rates, although there was a trend for these patients to come from social classes IV and V, and to be recognised as psychiatric cases at the screening survey by the general practitioners.

There was a positive and significant correlation between severity of psychiatric disorder and the number of major physical conditions. This relationship did not hold for minor

psychiatric disorder.

It was considered that these findings confirmed that there was a positive association between psychiatric and physical disorder. The findings also supported the view of Hinkle and Wolff that illness of all types tends to "cluster" in some individuals, whereas other people appear to suffer from relatively little or no illness. In the discussion it was emphasised that further ecological research, with the epidemiologist working in conjunction with his clinical colleagues, would be of great value in determining the distribution of all types of morbidity and characteristics of those who suffer from ill-health.

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Chapter One

Introduction

The relationship between physical and psychiatric morbidity has been examined by several workers in the past and their results have led them to conclude that psychiatric patients suffer more physical illness than other people. This finding has been based upon a variety of studies ranging from health surveys, such as those of Downes and Simon (1953), and Shepherd et al (1966), to the examination of individual medical records, exemplified by the work of Lovett-Doust (1952) and Roessler and Greenfield (1961). It has been demonstrated, notably by Hinkle and Wolff during the 1950's, that "clustering" of illness occurs in some individuals, with all forms of morbidity being involved.

However, these results have been difficult to evaluate because they have often been based upon the number of illnesses reported by the patients studied. This retrospective information has been collected either in the form of self-assessment by the patient or from medical records kept by hospitals and general practitioners. This has meant that the results could have been influenced and biased by the subjective nature of the patients' complaints, the patterns of consultation and the efficiency of the record-keeping. All these factors are likely to vary widely, particularly the memory different individuals have for illnesses they have experienced over a period of time. Events may be recalled for various reasons and minor or transient episodes might be forgotten in favour of the more chronic dis-

orders. The possibility arises that psychiatrically ill patients may not only recall more illness from their past but their known higher consultation rate might enable the practitioner to diagnose more physical illness. Should a physical complaint or memory of a physical condition be accepted at face value and not be confirmed by clinical examination, there is a serious risk of error. Similarly thresholds of complaint and consultation rates are important variables which have to be reckoned with. Further it is desirable that any population studied should be chosen on a random basis to avoid the problem of self selection by patients.

If these points are disregarded any association between physical and psychiatric illness may therefore be more apparent than real. It seems important at this point to examine the association between the two types of disorder independent of the statements made by the patients and the data from the medical records. The study which is to be described has the great advantage of taking a cross-sectional view of the patients' clinical state and using objective data independently collected from a randomly allocated general practice population. The physical and psychiatric assessments were made quite separate from one another, by different observers, at a health screening survey. Although the patients' complaints had to be taken into account for some of the diagnostic assessments, the use of strict criteria for diagnosis reduced the potential bias to a minimum. The patients' previous histories and surgery attendances did not have any direct bearing upon the results.

It was considered that any true association between

physical and psychiatric illness could only be properly demonstrated by minimising the potential bias. The hypothetical association was therefore examined on a randomly chosen sample of the general population. The psychiatric cases were matched with an equal number of normal controls and the dependent variable of physical illness was diagnosed with objective measures and by clinical examination. Thus every case included in the samples, whether psychiatrically ill or not, had equal opportunity for accurate physical assessment. Any limitations in the physical screening process applied to the same extent to every patient, although shortcomings which did exist were those inherent in the mass examination of a large population. The reduction of the problems of patient self-selection and threshold of complaint to a minimum enabled a fair and valid examination of the hypothesis to be made.

Chapter Two

Review of the Literature

I. Early Concepts of Mind and Body

It seems probable that from the earliest times, men have been concerned with illness, and especially the relation between mind and body in health and disease. The problem has excited the interest of the student of medicine and the philosopher since it can be examined both in a medical sense and in terms of man's relationship with nature. Primitive man, with his belief in animism and magic, explained all phenomena, including illness, in terms of supernatural influence. Thus, he could only resort to appealing to the gods for help. In the earliest cultures, such as the Assyro-Babylonian, illness was regarded as a punishment or a sign of moral impurity and treatment took the form of a confessional.

This concept of illness gave way to a naturalistic view with the onset and development of the Greek civilisation. Natural events were explained from physical principles. The cosmologists introduced the notion of the four elements, advances were made in brain anatomy and Hippocrates described the humours and suggested that epilepsy was not a sacred disease. The somatic view was not held exclusively since great thinkers accepted non-somatic causes. Galen stated that illness was always a condition of the body but causes could occur in the soul and the environment. Aristotle, in *De Anima*, stated: "Soul and body, as it seems to me, are affected sympathetically by one another; on the other hand, an alteration in the state of the soul produces an alter-

ation in the form of the body and contrariwise, an alteration in the bodily form produces an alteration in the state of the soul".

The onset of the Dark Ages saw the demise of the rational, naturalistic view which had prevailed during Graeco-Roman times, and the return of demonology. Not until the Renaissance did scientific ideas begin to advance again. Although there was an awareness of the effects of emotions on the body, psychology was largely left to men of letters. Thus, Shakespeare stated:

"Jealousy ... the thought where of doth like a poisonous mineral gnaw my inwards," and Francis Bacon, commenting on compensation for physical deformity, commented, "Certainly there is a consent between the Body and the Minde; and where nature erreth in the one, she ventureth in the other". The mind-body problem was continuously debated by philosophers, with the ideas of Cartesian dualism and monism attracting protagonists and stimulating discussion during the following centuries.

Physicians, with certain exceptions, mainly concerned themselves with the management of disease, rather than philosophical concepts. Psychological ideas were not developed along with physical medicine and by the 19th Century the mechanistic approach was supreme. Before this state was reached, there were many intolerant arguments on the subject concerned with causality and whether mind and body were distinct, related or different phases of the same subject. Two exceptional Englishmen contributed clinical opinions during the 17th and 18th Centuries. William Harvey (1628) applied his new experimental and observational

techniques to the circulation of the blood, although not in the traditional way within the framework of the humours. In *De Motu Cordis*, he commented on the important influence of emotions on the heart, saying that: "Every affection of the mind that is attended with either pain or pleasure, hope or fear is the cause of an agitation whose influence extends to the heart". He later elaborated his ideas in a collection of medical observations and also saw a relationship between the mind and generative system, from studying cases of pseudocyesis.

Thomas Sydenham (1682) from his great clinical experience suggested that one-sixth of his patients suffered from hysteria. He called unusual symptoms hysterical; those "which cannot be accounted for on the common principle of investigating diseases". He noted that hysterical symptoms were often accompanied by depression and that they could co-exist with physical disease.

Other physicians developed complicated ideas and promoted their practical application. Van Helmont (1692) put forward the view of a dynamic principle of material body processes attempting to integrate divine forces, matter and life. This was elaborated by Stahl (1708) into the theory that in disease the soul, or life force, was impeded in its functions. He stressed the role of passions in physical illness. Van Helmont suggested that insanity could be removed by violent physical means, and recommended ducking the patient in water, to the brink of death, in order "to suffocate the mad ideas". Later, Reid made a similar recommendation of loud noises such as cannon shots.

The diversity of opinions held during the 17th and 18th

Centuries can be shown by the viewpoint of Richard Mead (1751), whose theories had a lasting influence. He said that insanity was incompatible with other major disease since the body had not the power to sustain the two simultaneously. He derived this view from clinical observation, especially of a case of tuberculosis, and assumed that insanity "dispossessed" the body of tuberculosis and vice versa. This view prevailed for at least a century.

Burrows (1846) observed "an interchangeable relation between lunacy and phthisis pulmonalis; the latter being caused by the accession of the former". When statistical investigations into the causes of death in asylums later showed that tuberculosis was, on the contrary, common in the insane, a new theory was formulated. The theory of incompatibility was replaced by one diametrically opposed, namely, that insanity and tuberculosis shared a common diathesis, so that a person prone to one was also prone to the other. The discovery of the tubercle bacillus negated this. The theory of incompatibility affected treatment and encouraged the use of irritants, counter-irritants and lowering treatments for the insane, all of which aimed at making them ill, if only temporarily. Unwins (1833) called this, "the principle and practice of setting up disorder in one part, for the purpose of knocking it down in another".

19th and 20th Century advancement

It was during the late 18th and early 19th Centuries that psychiatry emerged as a separate discipline. Physicians began to concern themselves wholly with mental illness and in keeping with the advance of scientific ideas, and especially human physiology,

the emphasis in the early 19th Century was towards the somatic approach. It was generally considered that mental illness resulted from brain pathology, and, particularly in Germany, attempts at classification were made within this framework. Griesinger and Kraepelin made the subject into, what Zilboorg (1941) has called, "Psychiatry without psychology". This approach was largely frustrated in its purpose and satisfactory analogues to organic medicine failed to be discovered, with the occasional exception. Towards the end of the century Freud not only re-discovered the unconscious mental processes but developed an operational tool to study them. In Alexander's (1962) phrase: "...this allowed him to go beyond a general abstract postulation of the unconscious and to study empirically its influence upon behaviour and physiology". Prior to the inception of the psychoanalytic movement, psychological factors in mental illness were partly recognised and accepted, in such phenomena as hypnosis and hysteria.

The development of the psychoanalytic movement was a significant landmark in that it appeared to offer a hypothetical basis for psychological causality. However, as Sir Aubrey Lewis (1954) has pointed out, "psychoanalytic investigators ... work with concepts of mental energy borrowed from 19th Century physics ... they try to translate libidinal flux into physiological flux and imply a causal nexus. It is difficult enough (even if one forgets that causes are multiple) to admit the notion that the quantity of energy in a psychic cause must be equivalent to the quantity of energy in a psychic effect which it produces". He

also wrote that "the old controversies about monism and dualism can be dismissed as pseudo-problems ... and that the "double-aspect" theory may be regarded as the prevalent one; it fits well with the operational point of view ... it is clear that psychodynamic formulations such as those of Freud cannot stand up to operational criteria at present".

However, to many people, Freud's original ideas on psychoanalysis were the foundation upon which later concepts of psychosomatic medicine were built. Psychoanalysis began with the examination of the psychological aspects of physical symptoms. Breuer and Freud (1895), in their study of hysteria, dealt primarily with the concept that certain physical symptoms can have psychological meaning and can represent problem-solving techniques in the emotional life of the individual. Freud even speculated that hypothetical toxins may accumulate in hysterically affected organs and give rise to structural changes, designated by others as 'organ neurosis'. The conceptual model was of two basic energy systems, the somatic and the psychic, in dynamic inter-relationship with each other. Separate emotions had a definite charge of instinctual energy seeking discharge. Normally a suitable outlet for energy was found, but if there was no acceptable outlet, the emotions would be repressed and remain in a state of tension. The interpretations of this varied. Freud suggested that the dammed-up libidinal energy, attached to recaptured early sexual fantasies, sought discharge, through a mental apparatus capable of existing at various levels of symbolic organisation. Dunbar thought that inhibited emotional

energy discharged in excess was the basis of anxiety, a mal-adaptation leading to pathological changes in organs normally mediating fright and flight. Faulty interaction between the mental mechanism and the cultural environment occurred during early infancy and the abnormal mental mechanisms corresponded to specific personality profiles. Alexander considered that the basic conflict was around the desire to take in and retain, and the desire to give out or to expel. He assumed that only those individuals who had specific organ vulnerability, which they had acquired earlier in life or which was genetically determined, would develop organic symptoms under the influence of specific emotional stress situations.

The analytic theories have been studied physiologically and many writers claim that in a number of chronic diseases such as duodenal ulcer, ulcerative colitis, asthma, essential hypertension, rheumatoid arthritis, thyrotoxicosis and neurodermatitis consistent patterns of psychological factors have been demonstrated. This last field of study has been given the broad title of 'psychosomatic medicine'. This term was originally introduced by Heinroth in 1818 and the contrasting 'somatopsychic' was coined by Jacobi in 1828. These different terms indicated the controversy at that time between the proponents of somatic and psychological factors in mental illness. The meaning of the term 'psychosomatic' has changed today and such writers as Deutsch, Dunbar, Alexander and Cobb have taken a holistic view, reviving the Hippocratic attitude towards disease. The W.H.O. report on psychosomatic disorders (1964) states: "The individual is

conceived as a complex dynamic system in an unstable state of equilibrium, acting and reacting to changes in the environment and to changes within that system. In disorder, that is disturbance of homeostasis, many aspects of the system are affected. When we speak of psychological processes and physiological processes, we are speaking of different ways of approaching one phenomenon. The phenomenon is not so divided. In this sense, then, there is neither psychogenic nor somatogenic disease but only disease".

With the emergence of a holistic view in medicine, purely speculative interest in the mind-body dichotomy has declined and scientific study of man's psychological and physiological functioning in relation to his environment has become possible. Henry Maudsley (1867), summed up this attitude as follows: "Life in all its forms, physical or mental, morbid or healthy, is a relation; its phenomena result from the reciprocal action of an individual organism and external forces: health as the consequence and evidence of a successful adaptation to the conditions of existence implies the preservation, well-being and development of the organism, while disease marks a failure in organic adaptation to external conditions, and leads therefore to disorder, decay and death....".

The psychosomatic approach has been tested in several ways. Psycho-physiological functions have been examined in the laboratory. The stomach has received special attention, since direct observation of this organ in patients with gastric fistulae is possible. A century ago, Beaumont (1833), studying

his patient, Alexis St. Martin, recognised that changes in gastric function were associated with emotional reactions. More recently Wolf and Wolff (1942) studied gastric secretion, muscular contractions and mucosal vascularity in their subject, Tom. Thus, anger, resentment and anxiety increased all these functions, whereas fear and sadness depressed them.

The relationship between cultural factors and changes in the body has been examined by Wolff (1950) and Ruesch (1951), and they have emphasised the important role played by the interaction of the individual with his present and past culture. Wolff claimed that adverse life situations call forth conscious emotional responses associated with a wide variety of non-specific organ reactions and that cultural patterns help determine which organ will respond to overt and symbolised stress. Other investigators have taken a wider view of the cultural situation. Thus, Halliday (1943) approached psychosomatic medicine as a public health expert and developed the concept of social sickness. He considered that the increased prevalence of psychosomatic disorders was due to changes in child-rearing practices, consequent upon changing socio-economic circumstances and value systems. Margaret Mead (1947) has speculated about the relationship between psychosomatic disorders and early child-mother relationships in different primitive cultures she had observed. Slightly outside the mainstream of the analytic movement, Adler (1917) had the concept of "organ inferiority" whereby in neurosis the body tends to compensate or over-compensate for a constitutionally inferior organ system, which thereby localises the symptoms.

However, despite analytic models and psychophysiological research it is clear that the term 'psychosomatic' has different meanings. The W.H.O. Expert Committee (1964) has pointed out the 'Psychosomatic Paradox', whereby the term has two meanings. First, they endorsed the holistic use, stressing that man, in health and disease, functioned as a psychosomatic unit. They regarded this as important for progress in medicine. The other meaning that is applied to specific disorders, is contradictory and when "limited to certain disorders, the unitary approach to medicine is undermined, the mind-body dichotomy is reaffirmed, and a temptation is offered to neglect psychological factors in some disorders and somatic factors in others". However, they agreed that, since valuable research had been carried out from both standpoints, the views should be regarded as complementary. The Committee noted that "stress" was a key concept in the aetiology of psychosomatic disorders; and in dealing with the controversial question of specificity between stress and a particular organ system, as in hypertension, peptic ulcer, asthma, neurodermatitis and rheumatoid arthritis, they regarded the results as having some plausibility but neither confirming nor refuting the thesis of psychogenesis. Their comments were made upon results derived from studies of life histories of patients; studies relating personality and various psychosomatic diseases, psychophysiological studies and animal experiments. They suggested that "the weight of experimental evidence clearly implicates psychological stress as a potent pathogenic influence".

Referring to epidemiology the problems inherent in this

approach were described as being mainly difficulties in sampling populations and lack of definition of what constituted psychosomatic disease. Often the most that could be asked for at this stage was to correlate symptoms commonly associated with psychosomatic disorders with demographic and social factors. Thus, it had been found that psychoneurotic symptoms and psychosomatic symptoms tended to occur together in the same individual, which suggested that there was a general type of psychophysiological instability, rather than the separate disorders of somatic or psychoneurotic origin. The W.H.O. Expert Committee underlined the importance of distinguishing firstly, between environmental stress and the response of the organism; and secondly, the psychological processes within the organism and the reaction of the physiological sub-systems in the organism to that psychological strain. Cooper (1964), discussing the epidemiological approach to psychosomatic medicine, proposed that two distinct lines of enquiry should be pursued, the first to relate the incidence of specific diagnostic entities and the distribution of identifiable personal and social characteristics in the population at risk; the other to plot distribution of illness experience in populations over a number of years. He considered that by treating psychological disturbance and physical illness as independent variables, and testing statistical relationships between them, a more scientific formulation of psychosomatic disease would be reached.

During the past thirty years, results from a variety of studies have suggested a relationship between physical and

psychiatric disorder. These have included examinations of hospital in-patients and out-patients, health surveys in the community and examination of case histories.

1. Hospital and Clinic studies

a. In-patients

Phillips (1937) examined 164 consecutive admissions to a mental hospital in South Wales. After excluding senile dementias and cases of G.P.I., 112 (68%) suffered from pathological lesions, which he regarded as an "extraordinarily high incidence of physical illness". These cases were divided into three groups: one in which there appeared to be a direct relation between mental and physical states, of which there were 14 in all when organic brain disease was excluded. Conditions such as anorexia nervosa and puerperal fever fell into this category. The next group contained 35 cases, with an apparent association, such as benign hypertension, secondary anaemia, thyrotoxicosis and some surgical cases. In the remaining 90 cases there was no association since the conditions were too varied to suggest an aetiological hypothesis. The author considered that the mentally ill might neglect their well-being with consequent lowering of resistance and that the socio-economic conditions prevailing in Wales at that time led to malnutrition. The male patients were on average 9½lbs below the average weight.

In a paper styled the 'Psychiatric Aspects of Somatic Immunity', Lovett-Doust (1952), studied the past histories of 272 psychiatric cases and 354 controls. All the subjects had to

be free from present disease. The psychiatric cases were drawn from two London hospitals and a group of army invalids, and consisted of 120 neurotics, 42 psychopaths, 59 affective illnesses and 51 schizophrenics. The controls were civilians and soldiers. Each patient was given a questionnaire in which 110 disorders had been compiled. This was made up of 38 symptoms and complaints of bodily nature and 72 somatic diseases and syndromes. Lay terms were used wherever possible. The patient's self-assessments agreed well with physical examination, records and the statements from relatives. He found a higher incidence of physical illness and complaints among the index cases, with psychotics having the greatest, then neurotics and psychopaths least. There appeared to be an association between gastrointestinal disorders and depression, and locomotor and cardiovascular disorders with schizophrenia. He suggested that the response involved the total personality and was manifested as either physical or psychiatric illness or both.

Roessler and Greenfield (1961), wishing to test the findings of Lovett-Doust examined the incidence of somatic disease in students. At the University of Wisconsin, 500 students attended the psychiatric clinic over a three-year period. This group was matched by age and sex with a group of students drawn from the normal population. It was shown that there was more illness of all types among the psychiatric group and even though the psychiatric patients attended the clinic more frequently than controls, they did so because they suffered a greater frequency of "real" illness. Significant differences were shown for 11 of

13 categories of illness, namely anxiety, headache, gastro-intestinal disorders, gynaecological disorders, neurological disorders, allergy, inflammations, upper respiratory infections, obesity, tumours and trauma. Differences were found for endocrine and skin disorders but not significantly. They considered that they had confirmed Lovett-Doust's findings and since their psychiatric population was less ill than his, then, "this fact might argue for a very intimate and pervasive relationship between the psychological and physiological throughout the broadest spectrum of adaptational ability".

After examining 175 cases admitted to a psychiatric unit, Marshall (1949) considered that in 44% the physical condition required attention, and that of this figure 22% had physical disorders contributing to the psychiatric state, 6% the converse and 15% coincidental conditions. A few years later in the same Unit, Herridge (1960) repeated the study on 209 consecutive admissions. He demonstrated that 34% of the patients had concomitant, consecutive or coincidental physical disorder. Five per cent, although referred as functional, had major physical disease as the principal diagnosis. In 2% the physical condition contributed to the onset of the psychiatric illness, in 8% the converse and in 16% they were unrelated.

In a Swedish study, Westrin (1961), commenting upon 852 cases from the Psychiatric Clinic in Gothenburg, stated that 77% either suffered from cerebral lesions, other somatic conditions or had more or less clear complaints of somatic quality. He asserted that "a clear hypochondriac tendency was noticed in 26.5% and

that in nearly half of these a physical disturbance of some quality was verified during the care of the patient". Several workers have used psychiatric in-patients to examine any association between psychiatric morbidity and specific physical disease entities. Alstrom (1942) reported that among the psychotic patients, age-corrected mortality was higher than in the general population, especially for circulatory diseases, and more so in those with mental illness of organic aetiology. The differences were less in the functional psychoses except for tuberculosis among schizophrenic patients. Schefflen (1951) demonstrated an excess mortality from cancer among paranoid schizophrenias. Buck et al (1955) studied 500 males with functional psychoses admitted over a 25-year period and comparing the death rate with that for the rest of Canada found a significantly greater mortality for circulatory diseases and tuberculosis. The authors commented that the higher death rate from tuberculosis, like that of Alstrom, had occurred in younger persons in earlier years. However, Ekblom and Frisk (1960), found higher death rates for tuberculosis among all age-groups in Finnish mental hospitals. In a 7-year study of psychiatric hospitals, Abraham (1959) considered that arteriosclerosis and hypertension were commoner in schizophrenics and psychosis associated with cardiovascular disorders, in institutions, than in normal people outside. He concluded that the evidence suggested "that psychiatric disorders producing implicit and later overt physiologic disorders may be partially responsible for cardiovascular diseases". In a study of coronary disease among chronic schizophrenics, Hussar (1965)

found that 31% had died of coronary artery disease and that this prevalence was comparable to that in the general population. However, he found that the fatality rate, incidence of sudden death and myocardial rupture and incidence of painless heart attacks were higher than in the general population. He concluded that these results might be explained by the almost complete absence of the anginal syndrome.

Reviewing the occurrence of malignancies among psychiatric patients, Ehrentheil (1956) found no significant excess nor was he able to show that there were differences among the schizophrenic subgroups. Lafferty (1964) found no excess of malignancies, compared with the general population, in 1451 male schizophrenics on whom autopsies were obtained, but reported that the life expectancy among psychotics was on average 7 years shorter than that of the general population. This finding was in agreement with that made by Hollister (1960) and Odegaard (1952). Further studies relating specific disorders to psychiatric illness have not provided consistent results. Waitzkin (1966), gave a glucose tolerance test to male in-patients and depending upon the age-group showed an 11 to 15% incidence of unknown diabetes which he thought resembled the prevalence in the general population. Sprinkle et al (1965) gave a full E.N.T. examination to 154 in-patients and although 5% had a hearing loss and 7% disease of this system, this was not regarded as significant. In a dermatological survey of longstay mental patients, Kidd and Meenan (1961) demonstrated disease in 24%, but no correlation with specific diagnoses and no excess compared with the general

population. In order to study mental stress and oral disease Davis (1962) gave the M.M.P.I. (Minnesota Multiphasic Personality Inventory) to 89 admissions to a psychiatric unit on whom dental examinations were carried out. He discovered a correlation between the anxiety scale on this inventory and a periodontal score and speculated whether psychological 'signals' could lead to physical and biochemical alterations in the tissue. Gosling (1957) showed an overall incidence of 5.9% for peptic ulceration in a mental hospital population. This was comparable to the figure for the mentally healthy. However, there were diagnostic differences, with the incidence lower among psychotics and higher among neurotics than in the mentally healthy. This low incidence for psychosis seemed to be almost entirely due to the very low incidence in schizophrenia. Within the neurotic group it was the depressed who were most susceptible, and then the addicts and asthmatics. Pilkington (1956) examined female mental patients for rheumatoid arthritis and agreed with previous reports that the incidence was lower than anticipated. The low incidence among schizophrenics led him to surmise that there might be a mutually exclusive gene for the two types of disorder. It is clear that these results from mental hospitals reflect problems of methodology, case-selection and unknown factors operating in institutionalised cases.

Eilenburg and Whatmore (1961) concerned themselves with physical disease in psychiatric emergencies admitted to an observation unit. From studying the case records, for a one-year period, they found that 18.4% of the patients had some physical

disease. By dividing the physical illness into related (causative) and associated, they demonstrated that 7.2% of the psychiatric disorder was secondary to the physical disease. In just under two-thirds, organic mental features were present, with central nervous system diseases and alcoholism producing the greater proportion.

b. Out-patients

Studies in out-patients departments have either consisted of physically examining psychiatric cases or attempting to measure neuroticism in patients attending for physical conditions. Exemplifying the first type, Wynne-Davies (1965), as a physician, examined cases referred to him by psychiatrists. In a two-part study he dealt with new out-patients who would normally have been assessed completely by a psychiatrist and another group of out-patients actually referred for a medical opinion. Of the 36 new out-patients, 15 had "probably related" physical disease, most of which was chronic respiratory and cardiovascular. The findings for the 36 specific referrals were similar with 11 having "probably related" physical disease. He recommended the notion of combined assessment in view of the cases of mixed aetiology.

MacLay (1965), as a psychiatrist, examined patients attending a medical out-patients department. Using a one-in-three sample method, she interviewed 100 patients. On concluding her series she then referred to the medical notes. She found that the patients could be divided into two groups, those in whom a structural lesion had been found to account for their symptoms and those whose findings were negative. Thus, 55% were

"functional" and when compared with the organic group were younger, less incapacitated, had less G.P. attendances and were more likely to have been investigated for the same complaint elsewhere. 26% of the total were mentally ill, with 21% being in the functional group. Conversely, abnormal physical signs were found in 38% of the series, but only 4% in the "functional" group. Using both clinical interviews and psychometric methods, Culpan, Davies and Oppenheim (1960) examined the incidence of psychiatric illness in medical and surgical out-patients attending a London Hospital. The 200 consecutive new out-patients (100 medical and 100 surgical) were examined after being assessed by the appropriate specialist. The results showed that whereas over 50% had purely organic lesions and 21% a purely psychiatric condition, in a further 15% there was a mixture of the two. In a later paper, Shepherd et al (1960) stated that in the 15% where psychiatric symptoms and a physical condition co-existed "the symptoms appeared clinically as exaggerations of, or as morbid reactions to, the physical illnesses rather than as their precipitants or causes". Psychosomatic conditions were assigned to the organic group unless a formal psychiatric illness was present. Although females predominated throughout the series, there was an even greater excess in the mixed group. Using the Cornell Medical Inventory (C.M.I.), and a cut-off point on the M-R (psychiatric) section, they reported scores for patients attending the out-patient clinics compared with normals and neurotics attending a psychiatric out-patient department. Although recognising that the threshold score of 10 would lead

to misclassification, they were able to show that the correlation between the C.M.I. score and a brief interview judgment in 45 women attending medical out-patients was +0.56. The scores for the out-patients lay between the normals and the neurotics, but nearer to the normals.

Other workers have reported varying findings on the co-existence of psychiatric and physical morbidity. Moersch (1932) found that 44% of 500 consecutive cases seen at the Mayo clinic had mixed psychiatric and organic features. Pearson (1938) showed 16% of medical out-patients to be neurotic and that "the majority had no recognisable organic abnormality, but in a few of them physical conditions of minor importance (such as postural defects, mild degrees of anaemia or menstrual disturbances) were present".

Brough and Fleminger (1965), reviewing 502 psychiatric out-patients referred by other out-patient departments over a three-year period found that in 25%, an abnormal mental state and organic disease co-existed.

2. Community Studies

A longitudinal observation of a sample of white families living in the original Eastern Health District of Baltimore was carried out by Downes and Simon (1953), to determine prevalence and incidence of chronic conditions. The families, living in 34 blocks, were generally visited monthly over a period of 5 years. Special inquiry was made into chronic disorders, including nervousness, and details were checked with the family doctor and hospital clinics. The annual prevalence rate for psychoneurosis

was 15/1,000. Although this was regarded as an under-estimate, this type of disorder rated 4th in both prevalence and incidence among all types of chronic illness. The morbidity experience of the 92 persons classed as neurotic was examined. The acute illnesses were measured as attack rates per person-year of observation and were found to be in excess of that expected from that population. This applied in particular to accidents, and persons under the age of 35 were especially affected. Similarly, the neurotic group developed more chronic illness than expected. Thus, for hypertensive disease, the expected incidence of new disease amongst the neurotics was 1.38 cases but the observed incidence was 4 cases. Again, whereas 14 of the 92 cases had a chronic condition in addition to their neurotic illness at the beginning of the survey, a further 13 cases developed one during the study. Moreover, the group was a young one, with 13 people below the age of 40. Psychosomatic disorders were not included.

The families of the 92 neurotic cases were then compared with other families, 828 in all, which contained an index case suffering from a chronic illness. In the majority of families the index case was the head of the family. The observation period ranged from 2 months to 5 years. Comparison of demographic features showed that the two groups were similar as were the socio-economic conditions under which they lived. The comparison for chronic illness showed that persons with chronic disorders were more highly concentrated in the neurotic families than the rest. (All index cases were excluded from the comparison and no person was counted in more than one diagnostic class.) This was

true of all diagnostic categories but outstanding for psychosis, mental deficiency, past history of rheumatic fever, and hypertension. Thus, in the families with a neurotic index case, 27% of the other family members had a chronic condition compared with 15% in the controls. This difference was highly significant.

Within the framework of the Stirling County study a comparison was made by Longaker and Godden (1960), of organic and psychiatric symptoms. A 20% sample in a town of 3,000 had earlier been studied by Leighton (1956), and she had suggested that 37% of the sample had symptoms of psychiatric disorder and were impaired by them to an important degree. These were neurotic and not psychosomatic symptoms. Judgments were based upon survey interviews, general practice and hospital records. All the symptoms which had been elicited from the sample were rated independently (with high agreement) by two physicians as to whether they were organic, serious or acute, chronic and intermittent. The term 'symptom' was used in a broad sense and could mean complaint, symptoms as usually indicated, diagnosis and past diagnosis. The findings ranged from 88% of the sample having or having had one or more, probable or possible organic symptoms (many minor or significant) to 11% having serious current organic symptoms. These were serious chronic disorders since acute disorders would have precluded interviews. In general organic and psychiatric symptoms co-existed in the same individual. Thus, 70% of the 29 individuals rated as having major, current, probably organic symptoms, were also psychiatrically impaired. Conversely, 20% of the psychiatrically impaired group had current,

probably organic illness; a greater figure than that for psychiatrically well or near-well groups. The authors were cautious about these results, pointing out possible errors from evaluator bias and data that was approximate and of uneven quality.

Leighton, Lambo et al (1963) examined organic and psychological disorders amongst the Yoruba of Nigeria. They obtained their data from two sources: responses about illnesses to a psychiatric questionnaire and physical examinations. Seven items in the questionnaire were related to physical systems rather than diseases and responses were complaints rather than medically verified diseases. It was found that women tended to have better physical and mental health. Patients rated as having psychiatric disorder had much more illness than those rated as normal. The authors suggested that because people reported physical illnesses in excess it would not follow that they would be regarded as psychiatric, i.e. on the basis of being hypochondriacal, since any psychiatric diagnosis warranted positive features. An internist then examined psychiatric and normal people, but failed to obtain many responders and his sample was not random. He examined in total 33 psychiatric and 20 normal cases. The findings were that the psychiatric cases suffered more from hookworm and had different physiques. So whereas 9 normals had a good physique and 4 were in poor condition, only 6 psychiatric cases were of a good physique and 15 in poor condition. The authors concluded by stressing that it was "easy to argue that psychological tensions might cause physiological disorders of

various kinds, but it is unclear why psychological disturbance would also increase susceptibility to such conditions as worms. It may be that just as it has been found that psychological tensions can lead to an abnormal number of accidents, so they can alter a person's internal physiological environment in such a way that it is less healthy for its owner and more healthy for unwanted visitors, such as worms, germs and other parasites. These findings throw no light on which comes first, the physical or the psychiatric troubles, and data are still lacking on the extent to which physical illnesses alone can bring about the development of psychiatric conditions. It seems probably that a condition of susceptibility would be a pre-requisite here, as it is in most varieties of disease".

Smiley, Buck and Hobbs (1955) carried out a short-term longitudinal morbidity investigation in which the illness experience for one month was analysed in terms of the sickness experience of the population in a previous month. Only those receiving medical treatment were included. A comparison was made between the group which had been ill in the first month and another which had been well. The survey months were two months apart. Codes of disease were developed from the International Classification of Disease and consisted of four grades of neurotic disorder, organic illness and accidents. The findings showed that the ill group had a significantly greater amount of definite psychosomatic disease (the most neurotic grade) and organic disease than the well group. They had excesses of chronic illness and females had an excess of acute illnesses.

Specific disease differences were anaemias, nutritional deficiencies and mild respiratory infections for the whole group; and severe respiratory infections in males and possible psychosomatic (3rd rating of neurotic disorder) degenerative cardiovascular disorders in females.

In a study designed to compare the mental health of persons on a new housing estate with that of persons living in an older area of the same town, Hare and Shaw (1965) demonstrated that persons with poor mental health tended also to have poor physical health and to be generally dissatisfied with their surroundings. The association was very marked on all the various indices of mental and physical ill-health, and the strength of the association varied directly with the defined severity of the nervous disturbance. Thus, of those who said that their general health was only fair or poor, the proportion among persons with severe or moderate nervous disturbance was 65%, compared with 43% among those with mild nervous disturbance and 15% among those with none. The only exception was that there was no association between past nervous symptoms and physical health. However, a history of rheumatic fever, chorea, diphtheria, poliomyelitis, meningitis and concussion was significantly associated with the presence of mild to severe nervous disturbance. They concluded that these findings were consistent with the general hypothesis that brain damage of an apparently minor nature tended to increase a person's susceptibility to mental illness. In conclusion they quoted Taylor (1954) who observed that "15% of patients cause nearly 50% of a general practitioner's work". He refers to these

people as being prone to more illness than others and as having a lower threshold of complaint: "both the physical and mental material of which they are made appears to be deficient".

From the results of their study into the psychiatric illnesses found in general practice, Shepherd et al (1966) demonstrated an association between physical and psychiatric illness. The psychiatric patients formed a large representative group of general practice attenders, within which individuals reported as being free from any psychiatric disturbance constituted a suitable control group. They found that emotional disorder in the survey sample was related to a high demand for medical care. Psychiatric patients attended more frequently and had higher rates of general morbidity and more categories of illness per head than the remainder of the patients consulting their doctors. The differences between consultation rates was significant in men for respiratory, gastro-intestinal and 'other' categories and in the last two categories for women. When it came to chronic illness prevalence rates for each illness category, the rates for the psychiatric patients were higher for every category of illness except neoplasia, for both sexes, and orthopaedic illness for women. They stated that although it could be maintained that these findings were largely manifestations of a high demand for medical care attributable to the patient's attitude to health, rather than the result of any real association between mental and physical health, there was evidence to suggest otherwise. Firstly, data from their survey indicated that patients who did not attend their general

practitioners at all for prolonged periods were healthier than average and carried a low risk of mental disorder. Then a substudy following up a sample of the chronic psychiatric cases showed that there was a high incidence of chronic physical illness, often closely interwoven with their psychiatric symptoms. Lastly, a study of chronic neurotic females and their families, by means of health diaries, reported more episodes of ill-health than a control group both in the index cases and the husband and children. They regarded these findings as supporting the view that chronic psychiatric disorder was positively associated with other forms of chronic ill-health and that, in part, psychiatric disorder could be regarded as only one aspect of the phenomenon of high-illness expectation noted by some workers as characteristic of a section of the population.

Kellner (1963) in a study of neurotic ill health in a general practice on Deeside found that the proportion of patients aged 15 and over who had symptoms of "Neurotic Ill Health" was significantly higher in patients with chronic physical illness and those with acute physical illness than in those patients who were physically healthy. There was no significant association in patients under the age of 15 years. He also examined the apparent inception of "Neurotic Ill Health", following physical illness, in convalescent patients. Convalescence was regarded as one month following discharge from hospital or a period of one month after having become ambulant if treated at home. The apparent inception was compared with the apparent inception of "Neurotic Ill Health" at other times. Patients with a known

psychiatric history were excluded from the comparison. A significant association was found between convalescence and the apparent inception of "Neurotic Ill Health". Most of the conditions were mild and the relationship was strongest in those treated in hospital. The patients with physical illness attended the surgery more often with "Neurotic Ill Health" than other patients. Two further findings were that patients with chronic physical illness also had hypochondriacal symptoms and that over half the neurotic patients attending during the survey year presented with somatic symptoms. This exemplifies the difficulties in general practice of sorting out organic and psychiatric disorder.

A study was carried out by Kay (1966) on the aged. A four-year follow-up of a random sample of 297 elderly patients, living at home, showed that the group who originally had functional disorders had a significantly higher mortality than the normals and their expectation of life from national figures. The conditions causing death appeared to be non-specific and only one patient committed suicide. The authors considered that the association between physical disability and mental illness was real and not hypochondriacal. They admitted the weakness in the study was that originally those with functional disorders had more physical ratings and so they might merely have been responding affectively to physical disease. A greater source of error was that the physical ratings were based upon questionnaire and observation rather than formal examination. Among the survivors, the psychiatric state had improved in nearly a third, whereas

overall the physical state had either deteriorated or remained the same.

Surveys of Psychosomatic Disorders

An epidemiological investigation of 11 psychosomatic disorders, in terms of lifetime prevalence among an urban population aged 20-59, was carried out by Rennie and Srole (1956). In addition to examining social class prevalence they measured the psychological dimension of tension-anxiety. While it did not correlate with socio-economic status, it did with the majority of the somatic disorders. These were diabetes, 'stomach' ulcer, colitis, bladder trouble, hay fever, heart condition, neuralgia, arthritis and skin rash. The exceptions were hypertension and asthma. Tension-anxiety was also highly correlated with multiple somatic ailments, especially in the upper and lower status groups. Thus, they regarded both sociological and psychological variables as vitally involved in these somatic conditions. Sainsbury (1960) investigated the relationship between psychosomatic disorder and neurosis in general out-patient clinics. 1,352 randomly chosen patients attending a variety of clinics completed the Maudsley Personality Inventory and their diagnoses were obtained and divided into four operationally defined groups: psychosomatic, possibly psychosomatic, control and neurotic. It was shown that patients in the psychosomatic and possibly psychosomatic groups had significantly higher scores on neuroticism than controls, whereas those with chronic, serious or disabling diseases did not differ. The psychosomatic group was also significantly more

introverted than controls. The author considered that the results indicated that psychosomatic diseases were distinct entities, and that there was some evidence to suggest that they were associated with either a dysthymic or an hysterical personality.

Kreitman, Pearce and Ryle (1966) examined the relationship between psychiatric, psychosomatic and organic illness in a general practice population. They made a retrospective assessment of the case records in a 30% sample. No positive correlations were found, with the doubtful exception of women between the ages of 21 and 30. They suggested that the reports of a positive concordance of physical morbidity and minor psychiatric morbidity were indicative not so much of a true association as of the fact that the problem of selective self-referral among such patients had not been overcome. They agreed with Kessel (1960) who found that patients with conspicuous psychiatric morbidity had high rates of consultation but no excess of consultations for physical illness.

Psychiatric Illness as a Prognostic Factor in Physical Illness

Another approach to the problem has been to evaluate the effect psychiatric morbidity has upon treatment and outcome of physical disorders. Thus, Querido (1959) attempted to isolate factors affecting prognosis for general hospital in-patients and showed that whereas 69% of patients were given the possibility of recovery, just over half of these had a favourable outcome. It appeared that social or psychic distress had an adverse effect upon recovery, in a non-specific fashion in a wide range of conditions. Dencker and Sandahl (1962) questioned

whether surgical treatment of mitral stenosis could produce major mental disturbances, but found the incidence of psychoses to be high both pre- and post-operatively, and considered that the operation alone could not be indicted. Rettersol and Sund (1962), looked for a connection between surgery for duodenal ulcer and nervous disorders. The authors independently assessed the records of 29 psychiatric patients who had undergone resection and found a relationship in 50% of the sample. A comparison of the two groups within the sample suggested that those with a connection showed greater nervous reactions prior to surgery, had more psychopathic traits, had a shorter interval between surgery and psychiatric hospitalisation, had a stronger tendency to drugs and drink and had more signs of organic brain disorder. In a study specifically dealing with the short-term prognosis of peptic ulcer, Rutter (1963) found that anxiety or depression at the first hospital attendance for any attack and at the onset of any attack, was significantly associated with a poor prognosis for the ensuing six months. Neither physical nor social factors were found to be of predictive value.

Prospective Studies

Several prospective studies have been carried out recently. Rosenman et al (1966) have studied 3000 individuals in order to ascertain the prognostic factors in coronary heart disease. After 2½ years, when 70 persons had developed the condition, it was found that the significant prognostic factors were abnormalities in the lipo-protein pattern, hypertension and the exhibition of a specific overt behaviour pattern. Moreover, not

only was behaviour the most important prognostic factor but the other factors only became significant when either or both of these occurred in a subject with the specific behaviour pattern. This, labelled 'Type A', described a pattern of excessive drive, aggressiveness and ambition, frequently in association with a relatively greater preoccupation with competitive activity, vocational deadlines and similar pressures. An enhanced sense of time urgency was also usually exhibited by people possessing this interplay of endogenous behavioural factors and exogenous pressures with various characteristic motor mannerisms. The authors did not venture to say what the mechanism might be in such cases.

Murray Parkes et al (1969) followed up a cohort of 4,486 widowers, aged 55 and over, whose wives had died in the year 1957. It was found that 213 of these men died in the six months following their wife's death. This was 40% above the expected rate for married men of the same age. During the rest of the 9 year follow-up period the mortality rate fell to that of married men and remained at the same level. The greatest increase in mortality rate was found in widowers with coronary artery disease and other arteriosclerotic and degenerative heart disease. There was evidence of a true increase in mortality from other diseases although the numbers were too small for a statistical analysis. A point of further interest was that in the first six months following the death of a wife, 22.5% of the widowers died from the same diagnosis as their wives.

Hagnell (1966), in a prospective study of the incidence of

mental disorder examined the outcome of a sub-group who, ten years earlier, had been suffering from hypertension, coronary heart disease or valvular heart disease. During the decade, 190% more cases of mental disease were observed in the men and 40% more in the women than were observed in the same age-specific incidence rates for the men and women in the total sample. The difference between observed and expected incidence rates was strongly significant for the men.

Since the hypothetical association between physical and psychiatric illness is being tested in the community it is important to review the available data concerning community ill-health. The collection of this information, its nature and distribution are discussed separately for psychiatric and physical illness in the following chapters.

II. The Distribution of Psychiatric Morbidity

The epidemiology of the mental disorders has been ignored until recent years. Only in the last two decades has serious attention been paid to the subject. Epidemiologists no longer limit themselves to the study of infectious diseases and accept that the distribution of mental illness and other chronic diseases may be studied by epidemiological methods. Definitions of epidemiology have been expanded, to include these new concepts and Greenwood's "The Study of the Mass Aspects of Disease" succinctly describes the new approach. The development of the discipline and the problems it faces have been described by Reid (1960), Lin and Standley (1962), Shepherd and Cooper (1964).

Problems of method and design, of the selection of the population to be studied, case-finding procedures and reliable definitions of mental phenomena have been the outstanding difficulties in psychiatric epidemiology. Despite these, the approach has become increasingly refined and all varieties of mental disorder and their social correlates have been examined. It has been increasingly accepted that psychiatric illness, like other forms of morbidity, is a continuously distributed variable. The severity, nature and distribution of disease may therefore vary in different population groups. Findings of studies of hospital and general practice patients will differ from those obtained from a random sampling of the general population, because of selection factors in the former groups.

Hospital statistics have been used to measure incidence

rates but their credibility has diminished. Ødegaard (1952) claimed that it was possible to use first-admission rates to mental hospitals to assess the incidence of psychosis, but, as Carstairs (1959) has pointed out, this can only be valid when the provision of mental hospitals has remained adequate to the needs of the population over many years. Other considerations are the uncertain number of people outside hospital and the time-lag between the onset of illness and admission. Bremer (1951) during an enforced wartime stay in Northern Norway, studied the population where he practised and showed that only 13 out of 38 psychotics had ever been hospitalised. Similarly, Fremming (1951) found that 25% of the psychotics on Bornholm had not been to hospital. Kalton (1968) commented that whereas "hospital statistics are valuable for measuring the morbidity of the more severe illnesses having, so to speak, a high cut-off point on the sickness continuum ... the selective nature of the information obtained from these cases make it essential that no attempt be made to extrapolate the finding beyond the field of hospital morbidity". If hospital statistics are unsatisfactory for the psychoses, they are even more so for the neuroses. Thus, Kessel and Shepherd (1962) showed that although the age-prevalence rates followed a similar pattern for in- and out-patients, the curve for general practice was quite different. The excess of young neurotics in hospitals was not found in general practice but rather the opposite with a predominance of middle-aged (especially women) and elderly persons.

General Community Surveys

Although population surveys have been carried out for many years, it is only during the last fifty that sampling procedures and statistical analyses have been applied. Thus, Cheyne (1753) said nervous disorders made up one third of the complaints of English people and a century later Cowan (1842) kept a register for one year and determined that 20% of the disease seen was either of the nervous system or of 'uncertain seat'. By 1911, Clouston was examining the frequency of mental disability in three generations of Orcadians. In the meantime, social investigators such as Chadwick (1842), Booth (1902) and Rowntree (1903), had surveyed the population in detail. The use of population sampling by Bowley (1915), heralded the methods increasingly developed during this century. Then followed the classical studies of Brugger (1933) on the prevalence of mental disorder and E.O.Lewis (1929) on the prevalence of mental deficiency. Both these workers were aided by local medical and social agencies in their search for cases. Thereafter followed widespread community studies both in this country and in the United States. In Britain, the Survey of Sickness ran from 1944 to 1952, and patterns of morbidity were obtained by the regular interviewing of representative samples of the adult population. Unfortunately these were lay interviewers, thus diminishing medical reliability.

American studies have used survey case-finding procedures. The Baltimore study, carried out by Lemkau, Tietze and Cooper (1941), investigated 50,000 citizens living in 1 square mile

and sought information from hospital records, psychiatric clinics, special schools, social agencies and the local health department. Faris and Dunham (1939), examining aetiological factors, used admissions to mental hospitals. Similarly, Malzberg (1936-1949) examined hospital admissions, described in a series of papers, and found that admission depended greatly on demographic factors. Gruenberg (1953) investigating psychoses in the aged, also showed that demographic factors influenced admission to hospital.

In the New Haven study (Hollingshead and Redlich, 1958), the criterion for a 'case' was whether it was under treatment, and the authors considered that by contacting all public and private hospitals, clinics, and private practitioners, they had a fairly good psychiatric census of New Haven. An extension of the Baltimore study by Pasamanick et al (1959) used a two-tier method. In the first instance a random sample of 4,000 households was interviewed about health and secondly, a 10% sample was clinically examined. Leighton, in the Stirling County study (1961) tried to estimate the true prevalence of psychiatric disorder. He obtained a probability sample of 1,015 heads of households and interviewed them all. Additionally, the general practitioners were interviewed and the records examined. Four psychiatrists made a separate rating of the data and a pooled rating was derived. Each patient was given a clinical category rating and an impairment rating. The Midtown Manhattan study (1957) used three approaches: identifying all residents who were "open care" patients on one day, intensive family studies of approximately 100 people, and a 2-hour questionnaire to a 1.5%

sample. All symptoms were summarised and independently rated by two psychiatrists for both mental health and functioning.

Other notable overseas studies were those of Essen-Møller (1956) in Sweden, who conducted a medical census whereby four psychiatrists interviewed practically every person in a small rural area, and Lin (1953) in Formosa who with local census registers and the help of local officials gathered information on members of every household in a rural district, a small town and part of a large city. Every mental case was then interviewed and a further census was made of every household by a psychiatrist. Lin found it easier to find psychotics than neurotics by this method.

More recent community studies in this country (excluding general practice) have been those of Fraser (1947), Mayer-Gross (1948), Hare (1956), Carstairs and Brown (1958), Taylor and Chave (1964). The methods used were different but the findings of the last two studies were of especial interest. By using census methods and documentary evidence, Carstairs and Brown compared mining and farming districts in South Wales. The cases consisted of patients treated in mental hospitals, observation wards and psychiatric units, those attempting or succeeding in committing suicide and persons convicted of certain indictable offences, over a 5½-year period. People committing serious crimes, defectives outside hospital and long-stay patients were excluded. According to these criteria there was a higher rate of psychiatric disorder in the urban industrial area, than in the rural district. The Taylor and Chave study reported on the

relationship between mental health and environment in a New Town. They quote the result of a mental health survey carried out by random sampling of the population (Martin, Brotherston and Chave, 1957). A ratio of 3:16 dwellings was used for sampling and all adults were personally interviewed on two occasions. Present and past complaints (for a period of 1 year) were asked for and a check list of 40 conditions was given. A gradient of mental illness was obtained, the rates depending upon the criteria: thus 1.9 per 1,000 were admitted as patients for psychiatric treatment, 4.4 per 1,000 were referred to an out-patient psychiatric clinic, 81 per 1,000 had general practice treatment for definite psychiatric illness and 330 per 1,000 reported subclinical neurotic symptoms.

Community surveys, however, give widely varying prevalence rates. Whereas Hollingshead, who was concerned only with cases under treatment, reported 8 cases per 1,000, Michael (1960), using a wider interpretation concluded that 815 per 1,000 had symptoms. Understandably, there was less disparity for the more recognisable severe forms of illness, but the range for neurosis was considerable. These results can only represent differences in case-identification and thresholds of severity. As Taylor and Chave stated: "the size of the catch depends upon the size of the mesh of the net that is used; mental institutions find the least, community services find more and direct interviews find the most. Indeed, the over-enthusiastic psychiatric diagnostician can find evidence of psychiatric ill-health in most human beings; such findings perhaps tell us more about the observer than about those observed".

General Practice Studies

A special type of community study has been developed in this country using patients of general practitioners. The advent of the National Health Service made such studies possible. It has been estimated by Gray and Cartwright (1953) that 97% of the population is registered and this has meant that medical and social data on the vast majority of the population has become available. Each patient has an Executive Council card which contains details of medical events in his life and information on sex, age, marital status and occupation. The potential for epidemiological surveys, using this data, is considerable but many problems must be solved before the material can be used effectively. Research in this sphere depends upon accurate and complete case-records, co-operation of general practitioners and the opportunity to take random samples of the population. Unfortunately there is a wide range in record-keeping, and those general practitioners who co-operate may be atypical. Also the usual diagnostic classifications are inadequate. These problems have been described in detail by Shepherd et al (1966) and Kalton (1968).

The earlier studies were carried out by enthusiastic general practitioners on their own lists. Different methods and classifications were used providing results which acted best as pilot studies and indicated approaches rather than definitive and comparative studies. Practices have been investigated by surveying patients registered, patients consulting with psychiatric symptoms, illnesses presenting and all consultations. The

problems of diagnosis have been clearly outlined by Kessel (1960) from examining one London practice. By using the I.C.D. he established a prevalence rate for psychiatric morbidity as 50 per 1,000. When 'conspicuous psychiatric morbidity' was added the figures rose to 90 per 1,000. The inclusion of patients with physical complaints and no confirmed organic basis increased the rate to 380 per 1,000. The addition of psychosomatic disorders such as peptic ulcer and asthma gave a total of 520 per 1,000. This figure did not include those patients having a neurotic overlay to their organic disorders.

Two studies have attempted to overcome these problems by involving large numbers of practices and using definite criteria. The College of General Practitioners (1958) was able to utilise the services of a wide scatter of doctors in its National Morbidity Survey. By adding the rates for formal psychiatric illness and psychosomatic disorders together it produced a total rate of 338.7 per 1,000 at risk. Shepherd et al (1966) described a study of psychiatric illness in London general practices. Before embarking on the work they considered that the following were desirable for such a study: the participation of a large representative group of collaborating doctors; a simple, empirical diagnostic classification; clearly defined, standardised indices for measuring morbidity; a system of sampling, in order not to overload the doctor; regular supervision of the survey; and a particular regard to design, method and data-analysis. By and large they were able to follow this scheme although there were difficulties in selecting a representative

group of doctors and handling the diagnostic classification. The diagnostic reliability was of low order and there was wide variation between individual practitioners. A total prevalence rate of 140 per 1,000 persons at risk was demonstrated, which compared well with the American Community studies using conservative methods, such as those of Lemkau (1941) and Pasamanick (1959). Again, the broad categories of diagnosis, psychosis, neurosis and psycho-physiological disorders were similar to that used by Pasamanick.

The study by Shepherd et al, helped to clarify the position of general practice for psychiatric research. It established that through the agency of the general practitioner, morbidity figures on practically the whole population became available; that contact with patients could be made through this intermediary, in a professional way; and that a more complete picture of psychiatric disorder was unfolded than hospital statistics had been able to show. An unsatisfactory discovery, however, was that there were wide interpractice variations in case-finding for all forms of morbidity. The reasons for this must be multiple and at least depend upon the biases, training and personality of the individual doctors. The correlation between the doctors and a questionnaire to measure psychiatric morbidity was certainly low. Rawnsley (1966) found that, although there were positive associations between C.M.I., general practitioner and psychiatrist as measures of morbidity, the estimates based upon the C.M.I. and judgments of general practitioners varied between social sections; this variation was not congruent. The survey-

finding by Shepherd et al, that those persons not attending their doctor had no higher risk for mental illness than attenders was a notable finding, but the assessment was by psychometric means, so the reliability was uncertain. The fact that the general practitioner may be suspect as a case-finder and that there may be covert mental illness in non-attenders is clearly a disadvantage in general practice research.

There is a need, therefore, to implement the random sampling methods used in American Community studies, so that attenders and non-attenders are sampled, and at the same time for the investigator to approach the patients and their records through his medical colleague, the general practitioner.

The questionnaire and interview approach have become increasingly used in community surveys, but this approach has its own hazards as Cartwright (1959) pointed out; "whether a person reports an illness to an interviewer will be influenced by such things as his impression of the purpose of the inquiry, his relationship with the interviewer, his attitude towards mental health, his ability to express his opinion and, of course, on the actual questions asked". Since psychiatric case-finding, especially at community level, is so dependent upon symptoms it is important that the instrument should be valid, reliable and standardised. As Reid (1960) stated "even more care is required in the selection, standardisation and application of such methods than in the more usual techniques such as mass-miniature radiography ... these case-finding methods should have the quality of the perfect witness ... they must go on doing this

consistently and reliably over the whole period of the investigation". Intrinsically, this ideal is hard to attain and the matter is further complicated by the nature of the disorder. Shepherd and Cooper (1964) commented that "By and large, the chronic fluctuating course of much minor psychiatric disability places a heavy strain on the customary units of measurement". They considered that there was not adequate information as to reliability, validity and stability over time of these instruments or the importance of cultural factors in determining the accepted norm. Additional to the problems of sampling and reliability of instruments are those of diagnosis and threshold of severity. These last two are related since, although psychiatric diagnoses are usually based upon symptoms and, to a lesser extent signs, at the level of minimal severity, it becomes difficult to define syndromes. In order to avoid the humiliation of merely dealing with symptoms, rather than diagnoses, which Lewis (1961) said "...throws us back to the infancy of medicine" it is necessary to develop the notion of minimal psychiatric severity.

III Screening for Disease

The development of the principles and practice of screening has been influenced by the changing pattern of disease. Whereas at the beginning of the century attention was focussed on the acute and infectious conditions, now medical attention is being devoted to non-communicable disorders. McKeown (1961) has predicted that this group of conditions, and in particular the psychiatric disorders, will constitute the major health problem in Britain over the next 40 years. This prediction applies to all developed countries and no doubt the same situation will arise in the less well-developed areas when the problems of contagion and malnutrition have been overcome.

Historically, screening was introduced as a form of preventive medicine. Wilson (1965) regarded the historical development as being in three progressive stages, both in terms of time and socio-economic growth. Tropical and sub-tropical infectious diseases, like malaria and leprosy, comprise his first period of time. The chronic communicable diseases of temperate climates, such as tuberculosis and the venereal diseases, were dealt with in the middle period. Lastly, during the late period (present time) the chronic non-communicable disorders (for example, diabetes, ischaemic heart disease and anaemia) predominate. Although screening has been carried out in many countries, at various stages of development, it is in the U.S.A. that changing attitudes and techniques can best be seen. Screening surveys have the dual purpose of protecting both the individual and society against disease. The emphasis will

clearly depend upon time and place. Crude and brutal screening methods were applied to the wave of immigrants entering America at the end of the last century. The Port Medical Officers would assess, by observation, the incoming travellers and dispatch anybody manifestly ill back to their country of origin. Personal suffering was ignored in favour of the advantages to society as a whole. This attitude still prevails and most countries practise strict immigration control in order to prevent the spread of epidemics. During the second period of time, the priorities altered with both the individual and society being afforded care and protection. American society became more stabilised and attention could be directed towards the common weal. The elimination of the chronic and debilitating infectious diseases began. Wide application of chest X-rays for tuberculosis and serological tests for venereal disease helped to isolate individual sufferers and led to treatment and prophylaxis being put into operation. As the infectious diseases began to wane, there was a real or apparent increase in the amount of chronic non-communicable disorders. When this was realised, two types of programme were put into operation. First, efforts were made to determine the prevalence of such conditions and second, to discover whether techniques of mass detection of disease could be developed and pre-symptomatic stages for each condition be demonstrated. The fundamental consideration was for the individual, although in an indirect way it was assumed that society would benefit enormously from improved individual health.

Multiple screening surveys were developed in the U.S.A.

during the 1950's. The definition of "screening" proposed by the United States multi-sponsored Commission on Chronic Illness (C.C.I.) in 1951 was the "presumptive identification of unrecognised disease or defect by the application of tests, examinations or other procedures which can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not. A screening test is not intended to be diagnostic. Persons with positive or suspicious findings must be referred to their physicians for diagnosis and necessary treatment." By 1957 the C.C.I. had accepted multiple screenings as "contributing to good medical practice" and stated that they "constitute a practical means for early detection of a number of important chronic diseases and impairments". The American Public Health Association issued a publication in 1960 which strongly endorsed screening, stating that "the sheer weight of economic reality ... dictates recourse to procedures that conserve the time and energy of highly trained personnel". These statements describe what Wilson (1968) has said are the two present aims of screening, namely, to discover and cure disease, in its early stages, before medical aid is sought spontaneously; and to make the best economic use of the available medical manpower.

Several types of screening have become available. Selective screening, carried out for such conditions as the anaemias of pregnancy and congenital abnormalities, is routine and well established. Mass screening surveys large unselected populations and often consists of multiphasic procedures. Doubt has been

cast upon this approach because the returns do not always seem to warrant the cost. Surveillance is where the general practitioner puts into practice personal preventive medicine on symptomless patients. Not only does he improve the chances of diagnosing early illness but gains better contact with his patients. In addition to these approaches, screening is used by specialists in hospital and industrial medicine. Although all these methods of screening are in use, the one which is the most controversial is the mass screening procedure since it offers more benefits to more people. McKeown (1968) has cogently argued that screening has an entirely different aim from ordinary medical care. When a patient seeks medical advice the doctor renders a service to the best of his knowledge and with the resources available to him. The position is quite the opposite when the medical authorities take the initiative since there is the presumptive undertaking that any abnormality will be detected, if it is present, and that those affected will derive benefit from subsequent treatment or care. Doctors have been prepared to take such responsibility in part because of increased knowledge of normal physiology and because there have been great advances in automatic data handling. Information on individuals can be rapidly collected, processed and stored. Laboratory specimens can now be examined in large numbers. The Kaiser Permanente organisation in California which has run a multiphasic screening programme since 1951, has now opened multi-test laboratories (Collen, 1965). Patients have a comprehensive series of tests at 20 stations over a 2 hour period. When the data is



received it is summarised and the patient's doctor receives a report. Initially, 4,000 patients per month were examined at an estimated cost, excluding the doctor's fee, of about £10 per examination. Whereas the Kaiser is a pre-paid medical programme, similar techniques were applied in different circumstances in Sweden. The Värmland Project (Jungner, 1965) was put into operation as a measure of expediency because of the shortage of doctors in Northern Sweden. A mobile field group collected specimens of blood and urine, with up to 250 samples tested daily. A nearby medical station had the capacity for 80-120 physical examinations weekly and a laboratory in Stockholm could deal with 400 patient samples per day. Between 1962 and 1964, some 65,000 people came under scrutiny.

Such large projects as these engender hope in those who support the notion of mass screening but at the same time evoke scepticism. In recent years there have been several commentaries upon the subject, including symposia at the Royal Society of Medicine (1966 and 1968), a W.H.O. publication (Wilson and Jungner, 1968), a series of essays (Nuffield Provincial Hospitals Trust, 1968) and leading articles in medical journals. The views vary from guarded optimism to rejection. The Lancet (1968) has stated that "no evidence has so far been produced to justify the view that screening offers a means of important financial saving to the N.H.S. and the central problem of prescriptive screening must still be to compare its effects with the effects of different types of medical expenditure it is premature to advocate nation-wide attempts at the pre-symptomatic recognition

of disease either on medical or economic grounds". The arguments for and against screening have been discussed at much greater length by Wilson and Jungner (1968) and McKeown et al (1968).

In their evaluation of screening procedures, Wilson and Jungner dealt with the criteria put forward by the C.C.I. The Validity of a test was defined by the C.C.I. as the measure of the frequency with which the result of that test was confirmed by an acceptable diagnostic procedure. The ability of a test to classify as positive those persons with the disease was termed "sensitivity" and the ability to class as negative, those without the disease was termed "specificity". The Reliability of a test, when this was a good index of disease, depended upon the variation of the method and the variation of the observer. The Yield was the measure of previously unrecognised disease diagnosed as the result of screening and brought to treatment. The authors presented ten 'principles' which they regarded as guidelines for planning case-finding. These were as follows:-

- i. The condition sought should be an important health problem. This can depend upon both prevalence and the serious consequences were it not discovered.

- ii. The disease should have an accepted treatment. This is regarded as being of prime importance and adheres to the notion of avoiding harm to the patient (the "primum non nocere" of Hippocrates). They emphasised the dangers of applying this principle when the disorder is at the pre-symptomatic borderline stage, since ethical problems are raised. If the concept of early screening becomes commonly accepted among the lay public, before

the efficacy of early diagnosis and treatment has been properly evaluated, then it will be too late and probably unethical to practise randomised trials of treatment. This argument clearly applies less to established diseases.

iii. There should be diagnosis and treatment facilities.

These should be available to all sections of the community. The developing countries have this problem to a greater magnitude since medical personnel is more scarce.

iv. There should be a recognisable latent or early symptomatic stage. This means that in the natural history of the disease there is an early stage during which detection and treatment can be applied.

v. There should be a suitable test or examination. This can indicate a screening test which is permitted to have a higher margin of error than the diagnostic test which requires to have good validity. In case-finding work, a fairly high false-positive rate is acceptable but false negatives should be very low.

vi. The screening must be acceptable to the population being surveyed. The severity of the condition, social attitudes and health education will all influence the acceptability.

vii. The natural history of the condition should be understood. In order to establish this, preliminary surveys are required so that the physiological variation and pathological significance of disease forms can be classified. These can be carried out by research units with no commitment to treatment. When clearcut pathological and borderline forms are delineated trials of treatment can be put into operation. This is distinct

from case-finding where there is implicit acceptance that specific treatments are known.

viii. There should be agreement on the groups for treatment. While there may be general agreement on the management of the developed clinical condition, it is important that there should also be a standard approach to the borderline cases. This might consist of expectant treatment and an effective follow-up programme.

ix. Cost-effectiveness. The aim of screening is twofold: first, biological, to improve the health of the community, by early detection and treatment, and possibly to lengthen life, and second, economic, to save expensive manpower and to strengthen the overall economy by reducing absenteeism through sickness.

x. Case-finding should be a continuous process. Regular offers of examination enable more of the population at risk to come under surveillance.

The authors anticipated that one of the benefits of increasing affluence would be more money available for personal health services. The effect of this might be to extend the disease-free period of life especially by the detection and correction of early departures from normal health. Ideally, these early measures should cost less than treatment at a later stage. However, the costing of such procedures is very difficult to carry out and the crude estimates possible must in any case be fitted into the economy of any particular community.

McKeown et al (1968), in a series of essays, devised a scheme for the evaluation of screening procedures and applied it

asttringently to 10 conditions. They stated that, in brief, the fundamental requirements for screening are to ensure that it is effective and that it makes better use of limited resources than the available alternatives. Although this is true of all medical practice, the difference lies in that the medical authorities instigate the process with a tacit assumption that it will be universally beneficial. It is essential, therefore, that before screening is in general use it is preceded by stringent validation and critical examination of the biological and economic criteria. They coined the expression "prescriptive screening" for the type of screening which has a direct contribution to the health of individuals, in contrast to that which aimed at research or the protection of public health. It is prescriptive screening which must submit to rigorous enquiry. The scheme with which each screening procedure was tested was divided into sections. These covered the need for clear definition of the problem, the position prior to screening, the evidence on the screening procedure, the evidence on the total problem, proposals for the acquisition of further evidence and proposals for the initial application of the procedure. These aspects of screening were applied to particular conditions by specialists in the field.

It was found that evidence was deficient in 6 of the screening procedures for natural history of the disease, methods of diagnosis and treatment, operational problems or assessment of benefits and costs. The conditions reviewed were bacteriuria in pregnancy, breast cancer, cervical cancer, deafness in children, diabetes mellitus, glaucoma, iron deficiency anaemia,

phenylketonuria, pulmonary tuberculosis and Rhesus haemolytic disease of the new-born. Only in the last two, and then only in part, were most of the requirements for general application well met. Cost-effectiveness and natural history were the areas of greatest ignorance. McKeown et al pointed out that although deficiencies have been found in these screening procedures, many are in use, which must indicate that the evidence has been misinterpreted or the criteria which should be examined before a screening programme passes from the research phase to general application have not been understood. The problems which require solving in the research phase are formidable. Examination of the natural history of a disease, proper evaluation of diagnostic instruments and operational methods and assessment of benefits and costs require extensive and expensive research programmes. Unless such programmes are carried out, non-validated prescriptive screening will be incorporated into medical practice and for ethical reasons proper appraisal of usefulness and risks will become increasingly difficult.

In an attempt to deal with the apparently intractable problem of cost-effectiveness the book included an essay by an economist. He rightly concluded that since the output in question is the preservation of life and health it is inconceivable that a 'balance sheet' could ever be produced in the ordinary sense of the word. Most of the important benefits are non-monetary in character. However, some crude assessment can be made by comparing costs for screening or non-screening methods in treating a particular disease.

These careful appraisals, tempered with caution, come at a time when the lay public is developing an understanding of screening. It is believed that valuable medical screening services are being offered, and since some are established and heavily subscribed to, they cannot readily be withdrawn for further evaluation. The subject is emotive and the protagonists of screening are able to statistically demonstrate the value of screening. It should be said that the strictures passed on screening are objective opinions and their purpose is to slow the widespread application rather than the abandonment of screening.

Current Knowledge of the Common Screening Procedures

Screening for Diseases

Obesity

Measurements of weight and height are readily acquired and it has been customary, by reference to standard weight tables, to determine the presence of obesity. Such tables have been developed by the American Society of Actuaries (1959) from insurance figures. Epidemiological surveys have been carried out in various countries and data is available from screening surveys. This is essential since height and weight vary with sex, area and country. Ashcroft et al (1967) compared a mining and rural area in South Wales and found that the mining population were shorter and lighter at all ages, except the women who were heavier in later life. It was found there was a gain in weight, but not stature, upon a British study during wartime conditions (Kemsley, 1943). Comparison with an American population showed the latter to be taller and heavier. A Dutch study (Beek, 1966) showed that obesity was 3-5 times commoner in women than men.

Further problems complicating the measurement of obesity are the variation of weight with somatotypes and the relative adiposity of the subject. Most standard tables now make allowance

for body fluid. Excessive weight due to fat rather than bone or muscle can be assessed by measuring skinfold (Edwards et al, 1955). The measurement of skinfold with a Harpenden Caliper is an attempt to obtain some indication of body-fat but has the serious limitation of considerable site and observer variation.

Fatness is generally regarded as increasing the risks of cardiovascular disease, diabetes, chronic respiratory disease and degenerative arthritis. However, life expectancy can be improved by weight reduction. Ungerleider and Gubner (1958) reported that the mortality ratio of overweight men was reduced from an expected 142% to 113% in men who were originally limited to substandard insurance but subsequently succeeded in achieving lower premiums after weight reduction.

Attempts have been made to obtain indices of obesity, derived from height and weight, for practical use in epidemiological, insurance and clinical work. To be acceptable, any index must be highly correlated with weight and independent of height. An overweight person may be obese owing to excessive fat but the overweight might also be due to excessive muscle. Since there is no reliable way of measuring body fat, then a satisfactory index must be highly correlated with weight. Khosla and Lowe (1967) compared the advantages of three indices on data from 5,000 individuals. They found that Quetelet's Index $\frac{(\text{Weight})}{(\text{Height squared})} \times 100$ satisfied the above criteria best, and recommended its use.

Respiratory Disease

Chronic bronchitis and emphysema are responsible for 7% of deaths in men and 3% in women between the ages of 45-64 in the United Kingdom (Cochrane and Fletcher, 1968). A survey by the College of General Practitioners (1961) showed a prevalence rate of 17% for chronic bronchitis in men aged 40-64. Strong evidence has been put forward to associate chronic bronchitis with atmospheric pollution and cigarette-smoking (Scottish Health Services Council, 1963). Three types of the disorder are now recognised by the Medical Research Council: 1). simple chronic bronchitis characterised by mucoid expectoration; 2). mucopurulent chronic bronchitis in which the sputum is intermittently

or continually mucopurulent owing to active bronchial infection; 3). obstructive chronic bronchitis in which, in addition to expectoration, there is narrowing of the airways causing increased resistance to airflow. Cochrane and Fletcher (1968) have stated that "emphysema and chronic bronchitis are commonly associated but either can cause fatal disability in the absence of the other".

The diagnosis of simple bronchitis can be made by asking questions on cough and phlegm. Six standardised questions have been recommended by the M.R.C. (1966). Sputum volume is useful and will permit a diagnosis of mucopurulent bronchitis when the sputum is infected, as will questioning about "chest illnesses". Airflow obstruction can be measured by respiratory function tests which are capable of detecting reduction of ventilatory capacity long before it is severe enough to cause disability (Cochrane and Fletcher, 1968). These methods of detection are easy, cheap and acceptable to the patient.

Although chemotherapy and bronchodilator drugs have undoubted value in established cases, there is no evidence that they delay progress in the early stages. There is evidence that decline in lung function is greatest in cigarette smokers who already have evidence of even mild airway obstruction. Propaganda concerning the adverse effects of smoking would seem to be the best form of prophylaxis. Trials of the effects of stopping smoking in early chronic bronchitis, and on the incidence of ischaemic heart disease are required.

Hypertension

It has been emphasised by Holland (1967) that high blood pressure, in its own right, is not a common cause of death or of admission to hospital. However, the majority of new ischaemic heart disease in middle-aged men is associated with elevated blood pressure, elevated serum cholesterol or both. The treatment and prevention of hypertension is therefore involved in the prevention of ischaemic heart disease. It has been demonstrated, both from insurance figures and specific research projects, that raised blood pressure increases the risk of mortality.

Bechgaard (1946) followed up 1,000 hypertensives and found that the mortality for men in the 40-49 age-group, with a systolic blood pressure between 180 and 200, was nearly five times greater than for the whole population. Women, however, had only one and a half times the normal mortality figures.

The measurement of blood pressure is difficult in two respects. First, there is variation, due partly to true variation in the subject's arterial pressure and partly due to measuring techniques. It has been demonstrated that recent physical exertion, the emotional state, room temperature, the position of the arm and subject, and observer bias are liable to cause variation in the measurement of blood pressure. Other factors influencing the result are the size of the sphygmomanometer cuff, arm circumference, weight and age. Second, there is no reliable threshold separating normotension and hypertension. Arterial pressure increases with age, and if the customary abnormal levels are accepted, 140 mm.Hg for systolic and 90 mm.Hg diastolic, it is found that the majority of the older population are to be deemed as hypertensive. It is clearly unacceptable to ascribe a disease process to individuals, without symptoms or other signs, on the basis of a statistical concept. Epidemiological surveys, such as that of Miall and Oldham (1958), have produced distribution curves with only quantitative differences between normal and abnormal. Miall (1963) and Pickering (1965) take these findings to mean that hypertension has a multifactorial aetiology.

Essential hypertension is usually classified into three stages. In stage 1 there are no objective signs of organic change in the cardiovascular system, but symptoms may be present. Stage 2 is recognised by objective signs of left ventricular failure established by physical examination, radiography or electrocardiogram. Stage 3 is characterised by damage in various organs due to the hypertensive process or secondary vascular lesions.

The approach to treatment depends upon the stage at which the hypertension is discovered. Certainly hypotensive drugs should be given in Stages 2 and 3. The advantages of treating

Stage 1 are uncertain and trials of treatment are required. If anxiety seems to be involved then psychotherapy or the use of anxiolytics should be considered. The value of hypotensive drugs in preventing the transition to Stage 2 is unclear and the side effects of postural hypotension and impotence may well be intolerable to the asymptomatic patient. However, there is some evidence that the benefit a patient receives from treatment is proportional to the level to which the arterial pressure can be decreased. Thus, statistically there is a better prognosis if the diastolic pressure is controlled below 105 mm.Hg. The implications of treating asymptomatic patients is considerable since it has been estimated that 5-10% of the population would be eligible.

Ischaemic Heart Disease (I.H.D.)

Oliver (1968) considers that screening for presymptomatic coronary heart disease is only justified on the grounds that it is a common cause of morbidity and mortality in the young and middle-aged and therefore harmful to the social and economic structure of the community. Thus arteriosclerosis and degenerative heart disease is responsible for the deaths of an increasing number of the young middle-aged, with one quarter of the 35-44 and one third of the 45-54 age groups in the 6 countries with the highest death rates, dying from this condition. Mortality figures over the last 10 years show that the death rate from I.H.D. is increasing, especially in the 35-44 age group.

Differing prevalence rates have been derived from surveys. The Framingham study (1957) showed overall rates of 24 per 1,000 for men aged 30-59 and Epstein et al (1965), examining all persons over 16 in one town, measured a prevalence of I.H.D. (including probable disease) of 49 per 1,000 for males and 33 per 1,000 for females. Rose (1963) reported on the prevalence in English working men aged 35-59 and demonstrated that with a questionnaire and E.C.G. readings based upon the Minnesota Code, the overall prevalence was 10%, but the inclusion of diagnostically weaker E.C.G. items increased the proportion to 20%. Variation in E.C.G. criteria provides one reason why prevalence

rates differ.

The use of the questionnaire and E.C.G. in the epidemiology of I.H.D. has revealed that many people have symptoms without being under care. In the survey carried out by Rose, 4% of the men had symptoms of angina and 4.5% symptoms of possible myocardial infarction, but three-quarters of the cases had been previously undiagnosed. Conversely, 2% had definite E.C.G. changes in the absence of symptoms and a further 10% had less definite changes. However, the E.C.G. has its limitations. While the inter-observer variation has been improved by the acceptance of the Minnesota Code, the instrument does not always diagnose people who subsequently die of ischaemic heart disease. Thus, in the six-year follow-up of the Framingham survey, of the 88 men who developed myocardial infarction, 15 (all of whom died suddenly) had no previous evidence of I.H.D. The Minnesota Coding Scheme was devised by Blackburn et al (1960) and has been used extensively, with revisions, since. It has been accepted and given detailed procedural rules by the World Health Organisation (Rose, 1968).

Population surveys have also established that certain variables can be used as a means of predicting the disease. The Framingham prospective study (1961) showed that hypercholesterolaemia, excessive cigarette smoking, E.C.G. abnormalities and hypertension were the most important risk factors. The combined effect of these factors is greater than any singly. From their data on London busmen, Morris et al (1966) designated 'causes' (age, parental history, stature, skinfold thickness, occupation, cigarette smoking), 'precursors' (casual systolic blood pressure and plasma cholesterol) and 'early' disease (E.C.G.abnormalities). The causes appeared to operate largely through the two precursors and the predictive power of these predominated over all others. Thus, three-quarters of the new cases of I.H.D. occurred in men with blood pressure and plasma cholesterol values in the top 25% of the distribution for the group. A W.H.O. working party in 1965 outlined the high risk factors in order of importance as: high serum lipids, high blood pressure, diabetes mellitus, cigarette smoking and stress. The relative weightings given to

the 'causes' and other indices are described in detail by Oliver (1968) and Wilson and Jungner (1968).

However, the purpose of identifying risk factors is to help practise primary and secondary prevention. In terms of individuals, at present our knowledge cannot be readily applied to this purpose. Thus, the methods available cannot be relied upon to disclose more than half of those who will ultimately develop the disease (Oliver, 1968). It has been calculated by Morris et al that for a 5-year period, the individual risk of developing I.H.D., with an elevated serum cholesterol and elevated blood pressure, is only one in seven. The advice which can be offered to any individual with high risk factors must, therefore, be tentative. This applies in particular to treatment. There is, as yet, no conclusive evidence that reduction in hyper-lipidaemia and hypertension causes a marked fall in mortality from I.H.D. Only by the reduction or cessation of cigarette smoking has benefit been shown (Doll and Hill, 1956). It was postulated by the Framingham team that should cigarette smoking cease, the mortality and morbidity from I.H.D. might be reduced by half.

Oliver (1968) felt bound to conclude that, in our present state of knowledge, surveys to establish a presymptomatic diagnosis of I.H.D. are not justified. Wilson and Jungner (1968) considered that individual effort could be directed towards a decrease in smoking, obesity and sedentary habits. The value of prospective studies is emphasised in both publications.

Anaemia

Although there are several varieties of anaemia, by far the most common is that due to iron-deficiency. This is due to imbalance between the intake and loss of iron, and is found much more often in women than men. The measurement of anaemia is easy, relatively cheap and has the advantage of being one of the few examinations that directly estimate the variable in question.

In 1959, a W.H.O. study group recommended that the haemoglobin values, below which anaemia could be said to exist, were 14 g/100 ml. for men and 12 g/100 ml. for women. These

levels were derived from world-wide data. In a recent review of English Community studies (Cochrane and Elwood, 1968), the summarised percentages of adults below these values were 22% of men below 14 gms and less than 1% below 12 gms and 10-20% of women below 12 gms with at least a further 4% below 10 gms. Menstruating women were particularly susceptible to iron-deficiency anaemia. However, a weakness of these findings has been to relate them to levels of morbidity, either physiologically or symptomatically. Attempts to significantly correlate haemoglobin level and symptoms of anaemia and a change in symptoms consequent to a rise in haemoglobin level following iron therapy have failed (Wood and Elwood, 1966; Elwood and Wood, 1966). These findings led Cochrane and Elwood (1968) to suggest that iron deficiency anaemia may not exist as a disease form. They pointed out that although a significant association between haemoglobin level and symptoms may be found in the future by sensitive exercise or psychometric tests there is no hard evidence to support the value of iron in women with levels below 8 gms. Nevertheless screening surveys might detect cases of pernicious anaemia, which has an estimated prevalence of 1/1000, wherein early diagnosis can prevent neurological complications in 1 in 20 cases.

Cancer of the Uterus and Breast

Cervical Cancer, although causing only 1% of female deaths, is responsible for nearly 25% of all deaths from cancer in women under the age of 50. A detailed study of the 5,000 invasive cases diagnosed each year, has shown that despite treatment 54% die within five years (Husain, 1968).

It was considered in the past that invasive carcinoma was preceded by carcinoma-in-situ. Serious doubt has now been cast upon this opinion and it is clear that the full natural history has not been elucidated. It appears that carcinoma-in-situ may progress to invasive cancer but how often and after what interval is unclear, nor how often the lesion regresses spontaneously. Knox (1968) has stated the deficiencies in our state of knowledge,

in that the errors of measurement are unknown, there has been no controlled trial, and there are no unequivocal reports that screening procedures produce a decline in the mortality rates from cervical cancer. In the reports that do exist, which support the view that screening can reduce the incidence, it has not been made clear whether this might be due to excision, of detecting carcinoma-in-situ, excision of early invasive cancers or the known natural decrease in incidence of the condition. Knox (1968) proposed cervical examinations of 100,000 women over 5 years in order to examine basic questions. This would require a survey on a very large scale, but in view of the limited evidence available on cervical screening seems to be a fundamental need.

Exfoliative cytology techniques are multiple and well tried. Claims for reliability vary from 70-97%. Smears can be collected by pipette, spatula, scrape and vaginal speculae. Women with positive smears proceed to a diagnostic punch or curative cone biopsy and ultimately hysterectomy if this is thought necessary. All tests are quick, free from danger and acceptable, but surveys suggest that it is the more vulnerable groups, social classes 4 and 5, who do not attend the clinics. The use of the self-collecting cyto-pipette has helped remedy this problem partially.

Breast Cancer is the leading cause of death from cancer among females. Some tumours appear to be hormone dependent and it is commoner in nulliparous women. The results of treatment, with surgery and irradiation are poor with a 37% 5-year survival.

The diagnostic procedures are clinical examination, mammography and thermography. The first two need to be used in a complementary way and the last is still experimental. However, screening the female population over the age of 35 would put an impossible burden on the present services, despite the knowledge that these procedures substantially increase the proportion of cases coming to surgery before nodal involvement. Lowe (1968) thought that a national screening service could not be introduced without prior research projects to test both screening methods

and find yields from surveys.

Other cancers

Screening industrial workers for hidden cancer has been found of use. Again exfoliative cytology is valuable in early detection of cancers of the oropharynx. Although cancers of the alimentary tract are a significant cause of mortality, means of early detection are limited although gastric photography and routine sigmoidoscopy have been advocated.

Rheumatoid Arthritis

Arthritis and rheumatism have a patient consulting rate of 65/1,000 in general practice and the estimated prevalence of rheumatoid arthritis in Northern Europe ranges from 2 - 3.5% in persons aged 55-64. There is, however, no specific treatment and no clear pre-symptomatic stage. There are, however, positive tests, latex fixation and Rose-Waaler, which might indicate that these detectable biochemical changes could be associated with early rheumatoid changes.

Other conditions

Other conditions within adult screening surveys are skin lesions, varicose veins, osteoarthritis, gynaecological disorders, peripherovascular disease and urinary tract disease. They are largely assessed by clinical examination following positive symptoms. Diagnostic rather than pre-symptomatic tests are available. Attempts to relate asymptomatic bacteriuria and later chronic pyelonephritis appear to be inconclusive (Wilson and Junger, 1968). It is important to obtain the complete natural history since, although the prevalence of pyelonephritis is not certain, it is believed to be a large public health problem. There is evidence that immediate treatment of infection in pregnancy is valuable in preventing further attacks, and reduces prematurity and foetal loss.

Screening for Objective Variables

Blood Urea

Urea constitutes the main component of the non-protein nitrogen in the serum. Raised blood urea is invariably the consequence of impaired renal function, but in early failure is not a reliable measure of renal dysfunction. The common causes of this are diseases affecting the kidneys such as infections and hypertension. Other causes, however, are sudden reduction in renal blood flow (extra-renal), as in shock and haemorrhage, and obstruction at any point in the urinary tract (post-renal) as with calculus formation and prostatic hypertrophy. A recent survey by Campbell et al (1968) on a random sample of 450 adults in Wales showed mean levels for men of 31.8 mg. (Standard Deviation 6.5) and women 28.7 mg. (Standard Deviation 7.1). There was a tendency for the value to rise with age, more so in women. However, 9% of all cases had values above 40 mg. which is the accepted upper limit of the normal range.

Blood Sugar

The usual purpose of estimating blood sugar is to screen for diabetes mellitus. The tendency to hyperglycaemia seems to be inherited, on a multifactorial basis, and such factors as multiple pregnancy, obesity, age, and steroids appear to be able to provoke it. Butterfield (1968) considered that as affluent societies exercise less, without reducing food consumption, so people become more obese and hyperglycaemic. The United States National Health Survey (1961) found a rate of 9 per 1,000 population of all ages for known diabetes while the estimated rate for unsuspected diabetes was 8 per 1,000. Butterfield (1968) analysed the prevalence in the United Kingdom as 3-4% of the adult population, with 1% recognised cases.

Blood sugar estimations have replaced screening based on glycosuria. A W.H.O. Expert Committee (1965) recommended working criteria for single blood sugar levels after glucose loading. Random blood sampling can also be used and has the advantage that it can be incorporated into a multiple screening procedure.

Glucose loading has the unfortunate side effect of contaminating the E.C.G. recordings.

The value of treatment in developed diabetes is supported by a considerable body of evidence which suggests that the complication of diabetes are minimised (Wilson and Jungner, 1968). However, diagnosis and treatment at the pre-clinical stage have not been clearly evaluated. Population surveys show unimodal distribution curves and the threshold for diabetes can be arbitrary. The W.H.O. committee (1965) recommended the following values at 2 hours in the standard oral glucose tolerance test: normal, less than 120 mg.%; diabetic, over 140 mg.%. In between, borderline cases. Butterfield (1965), advocated the higher cut-off point of 200 mg.% which represents a 50-50 chance of being diabetic. Below that level the probability is 'simple' hyperglycaemia with obesity and ageing, and above it, diabetes. Keen (1968) reported that treating mild hyperglycaemia reduces vascular incidents.

Butterfield, on the basis of a cost analysis, considered that only with expansion of the N.H.S. budget could the costs of screening be met and allow it to be more than a mere research exercise. Special attention should be devoted to high risk groups.

Uric Acid

Uric acid increases in the blood in gout, leukemia and nephritis. It is usually estimated in screening surveys to help detect gout. The consulting rate for the condition is 0.8 per 1,000 persons, as estimated by the British General Practice Survey (1965). Hall (1967) in an American Epidemiological Study found that 5% of males exceeded the accepted threshold of 7 mg.%. This figure greatly exceeded that for women. By 58 years, it was calculated that 1.5% of the population had experienced gout.

Gout is a condition with a recognisable pre-clinical stage (hyperuricaemia), and there is a high risk group within the population (transmitted by one/two genes) and an effective treatment exists. Thus, although not common, it satisfies several

of the criteria for screening.

Serum Cholesterol

The serum lipid level, including serum cholesterol, is dependent upon numerous factors including age, sex, race, nutrition, hormones, stress, climate and occupation. Considerable differences occur in the cholesterol distribution on normal men between populations and even within a relatively homogenous sample there is variation (Oliver, 1968). Doyle et al (1965) studied serum variation in men and found that over one year, nearly 50% of the sample had a maximum difference of at least 50 mg/ 100 ml.

Although the predictive value of the serum cholesterol level in the individual is low, for the group the risk of ischaemic heart disease has been shown to increase with a rising cholesterol level by the Framingham study (1961), Morris et al (1966) and Epstein (1965). Within the population, the distribution of serum cholesterol levels has a unimodal curve except perhaps for the very small group of familial hypercholesterolaemias. An accepted upper limit for normal individuals is a concentration of 300 mg./100 ml.

Protein-bound iodine

The protein-bound iodine test is used for assessing the state of thyroid function. Thus low levels are indicative of depressed function, as in myxoedema, and high levels of enhanced function as in thyrotoxicosis. The range of normal values is 4-8 µg/100 ml. The test is expensive and only under special circumstances can large scale capacity be reached. It is also influenced by previous practices such as the intake of iodine in cough mixtures, X-ray examinations and taking oral contraceptives.

Chest X-ray

This procedure is quick, reasonably reproducible and relatively cheap. It is used to detect lesions in the chest and to a lesser extent in the heart, on a mass scale.

It remains the main method of early diagnosis of tuber-

culosis. Sensitivity is of a high degree, through the use of multiple observers, although specificity is less satisfactory. As tuberculosis diminishes, so the cost of diagnosing each case is increased and there is increasing communal anxiety about the risks of radiation.

Regular routine chest X-rays seem the only practical means of screening for lung cancer. However, the results so far are not promising. Thus treatment cannot be successful unless diagnosis precedes metastasis of the tumour, and too often the first symptom is caused by metastases. There is no significant evidence that routine chest X-rays increase the chances of survival from this condition.

Chest X-rays have a place in the diagnosis of advanced chronic bronchitis, but in earlier phases, lung function tests and symptoms are of greater value. In advanced heart disease, radiologically the heart may appear normal even when left ventricular hypertrophy is considerable, but special views are useful and pulmonary congestion might be revealed on a plain X-ray.

Tests of Vision

In a middle-aged and elderly population, the visual defects worth screening for, other than refractive error, are diabetic retinopathy and chronic glaucoma. Since the first is involved in the early detection and management of diabetes, it is glaucoma which is largely screened for.

The diagnostic procedures are the measurement of intraocular pressure (tonometry), field screening and ophthalmoscopy by an ophthalmologist. Only the first two can be applied on a large scale. Tonometry not only has high false positive and negative rates but it is not clear that raised intraocular pressure is a preglaucomatous condition. While there is an increased prevalence of glaucomatous field defect associated with increasing intraocular pressure, a high proportion of cases have normal pressure and there is no evidence that reduction of pressure by treatment prevents loss of vision (Cochrane and

Graham, 1968). Field screeners have a high false positive rate, the negative rate being uncertain at present, and depend to some extent upon the age and intelligence of the examinee. They do screen for established disease, however, and not for what may alternatively turn out to be a spurious pre-clinical phase. Cochrane and Graham (1968) considered that far more research is required before large-scale screening is possible, except in the case of first degree relatives of chronic simple glaucoma patients.

Tests of Hearing

There is a tendency for impairment of hearing to increase with age and presumably is part of the ageing process. It is a nerve deafness and the high tones are affected first. Thus, although the deafness may not be apparent in everyday conversation, it may be detected by sensitive tests. Conduction deafness occurs in those with otosclerosis and following chronic inflammatory lesions of the ear. A further form of deafness is the congenital type.

In screening surveys, deafness is detected firstly by the response to various sounds, followed by audiometry in cases who fail to hear these sounds. The audiogram permits measurement of the degree of deafness.

Conclusion

In their review of screening for disease, Wilson and Jungner (1968) concluded that despite increasing medical and lay interest, at present we are at a comparatively primitive stage of understanding. In few conditions are the criteria laid down in their ten 'principles' satisfied. They saw an urgent need for further epidemiological work, in particular in carcinoma of the uterus, glaucoma, mental illness, asymptomatic bacteriuria, cancer of the breast and lungs and hypertension. A plea was made

for standardisation of nomenclature and method with the World Health Organisation as a suitable regulator.

It seems apparent that what McKeown et al (1968) defined as 'prescriptive screening', that is early detection and treatment, is applicable in few conditions. Screening surveys are largely best regarded as research enquiries. They exemplify one epidemiological method for isolating cases with varying degrees of severity. They help provide means for a better understanding of the prevalence and natural history of disease. When this is understood trials of treatment and cost-benefits can be evaluated.

Currently there is confusion as to what constitutes pure and applied research and a service for individual patients. In a consumer society expectations are high, as much for medical care as other products, so whereas the medical authorities must fulfil their obligations to society they must not create ethical problems for themselves and engender scepticism in the public at large. Unfortunately medical authorities have committed themselves to some screening programmes prior to validation and it has become a matter of local pride to subscribe to such 'advanced' methods of disease detection.

IV. Screening for Psychiatric Morbidity

McKeown et al. (1968), as previously stated, have divided screening into three types: for research, for protection of public health and lastly, styled as 'prescriptive screening', a direct contribution to the health of individuals. Further, they have prepared a scheme for evaluation of prescriptive screening procedures. It is clear from applying their scheme to psychiatric disorder that in too many respects, in particular, definition of diagnostic categories, knowledge of the natural history, reliability of screening methods and effectiveness of treatment, there are uncertainties; and it is evident that at present screening for psychiatric disorder must remain in the experimental phase, and not yet suitable for inclusion in the medical services. There is a use, however, in research and in detailed individual case studies.

It is clear from the community studies previously outlined that research designs must pay special attention to defining minimal psychiatric severity if normative is to be separated from morbid data. Symptoms by themselves do not necessarily make psychiatric syndromes. Since the distribution of symptoms such as 'fatigue', 'irritability', and 'anxiety' throughout the general population is uncertain, it is useless to accept one or two of these symptoms, per se, as indicating morbidity. Only by relating symptom patterns into the framework of the clinical interview can they help provide evidence of psychiatric morbidity. When illness is thought of as a continuously distributed variable, the gradient from the most severe forms of disease continues,

through minor forms to complaints of symptoms which are either so mild or personality traits that they cannot be considered abnormal. It may be claimed that coronary thrombosis as the most severe form of ischaemic heart disease and angina of effort as an early indication of abnormality is theoretically an analogous concept. It is theoretically possible, therefore, to place all individuals on a continuum according to the severity of their psychiatric symptomatology. It is standard practice in general medicine where, for example, electrocardiograms, exercise tolerance tests, and blood chemistry estimations have been established for many years. In psychiatry, the clinical interview is still the final arbiter of morbidity, although some progress has been made in the development of standardised interview schedules and questionnaires. These objective measures can hardly be compared with diagnostic aids available to physicians in other medical specialties. Perhaps the most promising way of refining screening procedures available currently is by improving the reliability of clinicians interviewing patients by standardising their methods.

Standardised interview schedules must be administered by psychiatrists since they are in the best position to assess the mental state. A high inter-rater reliability between psychiatrists may be achieved by training. However, in a screening survey it is often not possible for the psychiatrist to interview every patient. Since only a minority of the general population suffers from psychiatric disorders, too much of his time would be spent interviewing normal people. Screening devices have been used to

identify patients who may be suffering from psychiatric disorders. These patients would then proceed to the second phase of the screening where they have a clinical interview with a trained psychiatrist.

An instrument which has been widely used as a screening device is the Cornell Medical Index Health Questionnaire (C.M.I.). This is a four-page, self-administered inventory made up of 195 questions, which correspond closely to those usually asked in a comprehensive medical interview. It uses informal language and the answers are circled "Yes" or "No". There are four kinds of questions relating to bodily symptoms, past illnesses, family histories and behaviour. There are different forms, for males and females, differing only in the six questions related to the genito-urinary system. It is composed of 18 sections, the last six of which search for emotional disorder. Completion takes 10-30 minutes. The C.M.I. was designed and developed by Brodman and his associates, the present version being revised in 1956. Their purpose was to develop a quick and reliable method of obtaining facts about a patient's medical history without the expenditure of the physician's time. Used as an adjunct to medical interview on 179 medical out-patients, it was found that the agreement between C.M.I. and interview corresponded closely to the correlation between two independent oral interviews (Brodman et al, 1949). They also claimed that the C.M.I. is useful as an evaluator of emotional disturbance and tests have been carried out in a hospital out-patient department, comparisons having been made between scores obtained

by known psychiatric patients and randomly chosen normals. Independent ratings of severity made by non-psychiatrists, based upon the scores, showed very high agreement with psychiatric evaluations (Brodman et al, 1952). From the results, the authors suggested that there was presumptive evidence of emotional disturbance where the patients gave 30 or more "yes" responses to the total questionnaire or 3 or more on the psychiatric section. Thus, although the C.M.I. does not eliminate the psychiatrist or make diagnoses, it does give some indication of the severity of a psychiatric condition which may be later confirmed.

Culpan et al (1960) studied the use of the C.M.I. in a variety of out-patients at a London hospital, in particular to determine a critical score separating "emotionally normal" and "emotionally ill". Normal employees from a London store and psychiatric out-patient attenders were compared. It was shown that a score of 10 or more on the M-R section (psychiatric) discriminated between neurotics and the others with the minimum of mis-classification. Only 20% of the men and 24% of the women were placed in the wrong category by the instrument. The inventory also correlated satisfactorily ($r = +0.56$) with a brief-interview psychiatric judgment. But since the C.M.I. is a symptom inventory it did not help to distinguish between those worried and upset by physical illness and responses by hysterical and hypochondriacal patients. Nor were the authors able to suggest score patterns pointing to a diagnosis of neurosis or psychosis. Women were found to score a good deal higher than

men, even in the normal group.

The first use of the C.M.I. in general practice was by Brown and Fry (1962). They obtained completed questionnaires on a sample of general practice attenders, a proportion of whom were regarded as neurotic, and on a further group of patients from a list recognised as neurotic by the general practitioner. The scores were divided into A-L (somatic) sections, and M-R (psychological) sections. These were compared with results from hospital studies. The first finding was that although there was no significant variation for age, women scored significantly more than men. For both men and women the mean total C.M.I. score for the non-neurotic G.P. attenders was significantly lower than that of the neurotic groups. The scores for the M-R section were again different. It was recommended that the scores separating 'normals' from 'neurotics' should be 30 for total score and 10 on M-R sections. It was suggested that since severity seemed related to score then altering the threshold would provide more or less emotionally disturbed people. A total score of 30 identified 84% of the cases diagnosed as neurotic by the general practitioner and psychiatrist; 57% of cases diagnosed solely by the general practitioner; and mis-classified 19% of the normals. Since 93% of the sample returned the questionnaire and the instrument separated 'neurotics' and 'normals' with fair success, it was considered to have a use in general practice surveys.

Rawnsley (1966) tested the congruence of assessments made using a modified version of the C.M.I. with the clinical judgments

of a psychiatrist and general practitioners. Positive associations were found between the three independent measures of psychiatric morbidity, taking the sample as a whole. However, although the C.M.I. estimates and general practitioner judgments varied between social groups, the variation was not congruent. The C.M.I. scores were highest in the lower social groups. This could not be explained by differential frequency of contact with the general practitioner nor in the mode of presentation of symptoms. It was suggested that general practitioners may perceive psychiatric disorder differently in the various social strata.

In a wider application of the C.M.I., Shepherd et al (1966) obtained data on 2,245 patients in 14 general practices. The extent to which the individual items of the questionnaire discriminated between psychiatric patients and normals varied considerably. A threshold of 10 on the M-R section identified 15% of males and 35% of females as emotionally disturbed. Although these figures corresponded to those made by general practitioner assessment, the age distribution differed with the two measures. The C.M.I. identified younger age-groups. The correlation between general practitioner and questionnaire was low ($r = +0.19$). Presenting the data in accumulative form revealed that the C.M.I. differentiated well between psychiatric out-patients and general practice 'normals', whereas the general practice psychiatric cases were intermediate but closer to the 'normals'.

As a screening device the C.M.I. was found to be deficient.

Thus, 30% of psychiatric out-patients, clinically confirmed at interview, failed to score 10 on the M-R section; furthermore, a body of general practice patients scored high but were not recognised as psychiatric cases by their family doctors. The reliability shown on re-testing was so high ($+0.87$) that it led to the suspicion that individual scores might be related to personality factors. The effect of socio-cultural factors could not be minimised either, since those in the lower social classes had a higher proportion of scores above the threshold. It was concluded that there was bias towards a "Yes" response to questions in the lower social classes, and not that they experienced a greater prevalence of psychiatric disorder. The diagnoses of the practitioners certainly did not follow this pattern. Other evidence of socio-cultural influences has been reported by Hamilton et al (1962), who discovered that high scores were associated with a history of disturbed environment in childhood. Women, with poor marital adjustment also had high scores. Higher M-R scores were associated with more physical symptoms.

In conclusion, the C.M.I. defines a different yet overlapping psychiatric population to that ascertained by the general practitioner. The questionnaire identifies larger numbers of the following groups: females, younger people of both sexes and lower social classes. As there is no conclusive evidence that the general practitioner is a better case-identifier than the C.M.I., there seems no reason why the C.M.I. should not be used in population surveys, as a primary screening instrument prior to

psychiatric interview.

In a recent discussion of the early diagnosis of depression Rawnsley (1968) pointed out the widespread distribution of depressive illnesses, and the potential danger from suicide. He considered that bouts of depression were self-limiting and screening would have to be carried out at regular intervals if a sufficient proportion of episodes were to be recognised. Since the majority of depressive illness was treated solely by the general practitioner, effective screening could only be carried out at his instigation. Rawnsley considered that, as the instruments designed to screen populations were largely directed towards neurotic disorder in general, there was perhaps need for a questionnaire specifically concerned with depressive illness. Since no ready-made questionnaire validated in general practice was available, he recommended the Beck Depression Inventory. This consists of a list of descriptive statements, related to 21 aspects of depression, on which the patient rates himself on a 4-point scale. A small validation study has been undertaken by Metcalfe and Goldman (1965) on hospital in-patients, which gave results comparable to those obtained by Beck.

The limitations of this approach are at least two-fold: first, cases of severe depressive illness with strong suicidal tendencies are uncommon in general practice and there is no guarantee that, even were they presented with a questionnaire, concealment of symptoms would not take place. Second, the majority of psychiatric illness in general practice consists of minor affective illness interwoven with personality and social

problems. Thus, the Beck Depression Inventory does not seem particularly appropriate.

Another possible instrument for use in the screening survey would have been the Symptom-Sign Inventory (SSI) described by Foulds (1965). A detailed outline is given in the Manual of the Symptom-Sign Inventory (Foulds and Hope, 1968). The inventory was compiled as an aid to the differential diagnosis of the mentally ill. It has been used extensively but the data are based upon its use as an administered interview by a qualified psychologist. The Manual states that "the SSI is not intended to be a pencil-and-paper test, and attempts to use it as such have not been successful". In view of the fact that the SSI could not have been used as a primary screening instrument, because of the size of the sample being screened, it was decided not to use it in this particular study. N

In the present state of the nosology and classification of minor psychiatric disorder, the most profitable means of screening populations is to obtain a global estimate of emotional disturbance, and preferably some idea of severity, with pencil and paper testing followed by a clinical psychiatric interview. It should then be possible to outline the syndromes and the sub-groups most at risk.

V. Ecological, Biological and Sociological Concepts

Fundamental research has been carried out on the nature of health and ill-health and thoughtful reviews have been made of man's relationship, as a living organism, to his environment. The areas most relevant to this study are those of ecology, biology and sociology.

In a discussion of health as a social concept, Lewis (1953) viewed health as a single concept and stated that "it is not possible to set up essentially different criteria for physical and mental health". While taking this monistic viewpoint he underlined the superiority of the ways in which physiological, as compared with psychological functions, could be measured. Further, although conceding that estimates of efficient functioning most take into account the social environment he did not consider that the criteria of mental health were primarily social and regarded it as misconceived to equate ill-health with social deviation or maladjustment. He emphasised that by avoiding this error it became easier to examine the relation between health and social well-being.

In biological terms, man as an organism, can be understood to be continually reacting and adapting to his environment. A century ago Claude Bernard saw disease as the outcome of faulty attempts at adaptation. The adaptive response, although appropriate in kind, is too intense and can actually be destructive if sufficiently exaggerated. This theory clearly only deals with the simple biological mechanisms and does not explain all the pathogenic and stressful influences which come to bear upon

man in his environment. The need to examine all these effects upon the state of health led some American workers, notably Hinkle and Wolff, to consider the relation in detail.

During the 1950's they carried out a series of studies on the distribution of disease in several population groups and examined the influence of environmental factors and their significance. The groups examined consisted of 1,527 skilled male workers and 1,297 semi-skilled female workers from New York City, 100 Chinese immigrants drawn from the professional classes, 70 refugees from the 1956 Hungarian Revolution and 132 recent graduates from American colleges. The individuals in these groups were not selected on the basis of their health. In each case a detailed physical and psychological history was taken and in the smaller groups a physical and psychological examination. Wherever possible subjective accounts of "illness experience" were checked with health records. It was found that members of otherwise homogeneous adult populations exhibited differences in their general susceptibility such that some persons experienced a greater number of illnesses per unit time than others. On average, 25% of the members had experienced 50% of the episodes of illness over a 20-year period, whereas a further 25% had suffered less than 10% of the episodes. Analysis of the data showed further interesting points:

1. Those most susceptible to illness were prone to all forms of illness. They experienced a greater number of disease syndromes, both major and minor, involving a greater number of bodily systems and falling into a larger number of aetiological

categories. This applied not only to physical illness but to disturbances of mood, thought and behaviour. There was a positive correlation between the occurrence of neuroses and psychoses and the occurrence of bodily illnesses. Thus, one American woman during 35 years of working life had 1,041 days of disability, consisting of 95 disabling episodes and involving 15 bodily systems including psychiatric conditions. The authors concluded that "illness" was a state of the local organism and that when an individual became ill the "illness" was likely to be manifested by a variety of syndromes appearing concurrently or consecutively, the nature of which depended upon factors operating upon the organism at that time.

2. Illness was not randomly distributed throughout the population nor was it during the lifetime of an individual. Rather it appeared in "clusters". Each "cluster" might last several years and include several types of illness involving a number of bodily systems either concurrently or consecutively. These clusters alternated with periods of good health of variable duration. It was uncommon to find anybody who was always ill or conversely, never ill. The clusters of illness appeared most often when the individual perceived himself as having a difficult time in adapting to his environment. This did not mean that those who experienced a lot of illness had suffered more hardship; on the contrary, the "life experiences" of both high and low risk individuals were largely similar. Although a proportion of the frequently ill had had poor childhood rearing there were also healthy people who had had similar adverse childhood

experiences. Childhood experiences could not be invoked as a sole explanation for predisposition to disease in adult life. Family histories showed no striking differences although many of the syndromes suffered by the frequently ill were known to be familial.

3. The essential difference between those with a high frequency and those with a low frequency of illness appeared to be attitudinal. Those frequently ill seemed to be more predictably orientated towards goals, duties, responsibilities and reacted with more concern to events and situations which they encountered. They commonly viewed their lives as difficult, demanding, unsatisfactory and they were more inner-directed, more self-absorbed, more highly aware of emotional and interpersonal difficulties. The majority viewed their relations with their parents as having been unsatisfactory. In contrast the less frequently ill were contented, with little awareness of emotional problems. They viewed their lives as satisfying and the majority remembered their relations with parents as having been good.

Hinkle and Wolff (1957) concluded that illness often occurred when a person perceived his life situation as particularly threatening to him, even though it may not have appeared so to an outsider; while those maintaining good health, in a setting of "objectively" difficult life situations did not usually view these as difficult. In speculating about these findings they regarded man as an independent living system surrounded by an environment with which he constantly relates. In

contrast with physical agents there is no mechanical exchange with the social milieu but rather "picking up information with special sense organs". So whereas "stress" and "load" in physics imply proportional inter-action, in medicine "stress" and the internal response are not proportional. Each person's response is according to his own regulatory mechanisms. All sensory information is stored in the brain and evaluated in terms of the constitutional endowment and previous patterns of learning. Effective action may then take place. In order to carry out this highly complex adaptation, the central nervous system has to have an enormous capacity for altering body processes. The authors confirmed from laboratory data that "there is no aspect of the human system which cannot take part in, or be influenced by, adaptive reactions initiated by the brain in response to configurations in the social environment". All bodily systems might be enhanced, attenuated, stimulated or depressed by hormonal, nervous or circulatory control. The effect might include increased vulnerability to tissue damage thus leading to the development of pathological processes which are irreversible and ultimately fatal. The authors saw the clustering of illnesses as occurring each time an adaptive effort was made by the organism. Finally, they concluded that "man's relation to his social environment has relatively small influence upon the form which illnesses will take, but it has a major influence upon the time and the situation in which illnesses will occur and the course they will pursue".

Shortly before his death, Wolff (1962) enlarged upon his

concept of disease in man. He explained that there had been a gradual understanding of human behaviour in threatening situations. In the first half of the 20th century there had been acceptance that stressful life circumstances, including interpersonal, could be major factors in disease and in psychosomatic, neurotic and psychotic illnesses in particular. He considered that the evidence had come to suggest that this applied to illnesses of all kinds. He cited laboratory experiments whereby various body reactions, such as vasodilatation, pain threshold and mucous secretion varied under emotional distress. Further, he quoted evidence from studies of prisoners-of-war. Thus, those American soldiers incarcerated in the Far East during World War II, had mortality and morbidity rates, following liberation, greatly in excess of their peers who had not suffered in the same way. The admission rate to hospital was closely related to the stress endured by the soldiers during imprisonment. Another study was on Norwegian war-veterans who 12 years after liberation from concentration camps had failed to readjust to civilian life. They had suffered from physical neglect and had been persecuted while in prison. Out of the 89 subjects examined, including encephalography, 75 were shown to have had suffered some degree of cerebral atrophy.

Wolff viewed disease in man as having a more complex meaning than that elaborated by Claude Bernard. He considered that not only did man have to adapt to bacterial, mechanical and chemical insults but also threats of danger and in particular his relations to other people. When threatened his reactions serve

to protect, but they may become inappropriate in kind and amount and thereby block interaction and communication with other people. Normal body patterns become uncontrolled and functions are continuous rather than phasic with the result that tissues are pressed beyond their limits. This leads to either dysfunction, symptoms and disease or to acceleration of the processes of ageing. He concluded that this unified view of human pathology (he deprecated sub-classification into psychosomatic, psychiatric, medical and surgical diseases) properly related man's attitudes and values to ~~the~~ his health and even survival.

The Relation of Specific Attitudes and Emotions to Certain Bodily Diseases

While the responses of groups to stress has had detailed examination, other workers have concentrated upon individual responses. Grace and Graham (1952) considered that although diseases occurred in settings of difficult life situations it was not clear why individuals suffered from a particular disease or syndrome. They regarded previous investigations and postulates as unsatisfactory. These investigations included work on patients having the same disease with a particular personality pattern or personality, or with the same unconscious "nuclear conflict", or with similar child rearing practices. Clearly these factors did not apply to all those with the disease and vice-versa. Grace and Graham set out to explore the hypothesis that a symptom or disease might be associated with a specific attitude. Thus 128 people attending an out-patient clinic with one or more symptoms were given regular interviews with the purpose of defining those

situations temporally associated with attacks of the patient's symptoms. The statements made by the patients were conscious and not based upon dreams or free association. It was accepted that the reliability of these statements would be enhanced if there was congruence between the attitudes of those patients with the same disease. When a situation was linked in time with a symptom a description of each patient's attitude was obtained, both in the sense of what he felt was happening to him and what he wanted to do about it. The results showed that the attitudes to the illness of patients having the same symptom-complex, were essentially the same. For example, those with urticaria felt themselves being mistreated; those with asthma saw themselves faced with a situation but wanted to do nothing about it; those with duodenal ulcers saw themselves seeking revenge. In many cases the attitude seemed to be a description of the physiological response with which it was associated. The authors stated that "most of the common diseases can be viewed as the outcome of physiological adjustments which, although appropriate in some circumstances, may eventually entail discomfort, disability and danger to the organism".

Their hypothesis was further tested out in the laboratory (Graham et al, 1958; Graham et al, 1962). Healthy male volunteers were hypnotised in the experimental situation, attitudes were artificially induced in them and the response measured by means of physiological variables. In the first experiment it was predicted that inducing the attitude associated with Hives (urticaria) would raise the subject's temperature whereas the

induction of the attitude associated with Raynaud's Phenomenon would lower the temperature. This was found to be the case to a significant degree. Similarly, the prediction that there would be a greater rise in skin temperature and a smaller rise in diastolic blood pressure between subjects artificially induced with the attitudes of Hives and Hypertension was again realised. The authors failed to show however, the crucial step between a physiological response and the development of structural pathology. Only in animal studies has there been evidence of pathological lesions following experimental stress and it is not certain how this evidence can be applied to the human organism in the normal life situation. So Porter et al (1958) produced gastro-intestinal lesions in behaviourally-conditioned monkeys; Ottenburg (1958) demonstrated learned asthma in the guinea-pig; Ader (1965) investigated social factors related to disease in animals; and Friedman (1965) showed how psychological stress affected the response of the mouse to the inoculation of a virus. Shapiro (1958) reviewed the subject in detail but having made observations on blood pressure and other physiological and biochemical mechanisms in rats with behavioural disturbances failed to show any substantial pathological changes.

Sociological Approach

Mechanic (1966), as a sociologist, placed great emphasis on psychological and social factors in the way in which illness presents. He considered that the effect of these factors had not been sufficiently considered, and that clinicians accepted that it was the "biological" component of illness which decided

whether medical care was sought. Mechanic described a pattern of behaviour, styled "illness behaviour", which he stated affected consultation rates so that "illness" depended upon the way in which an individual perceived, evaluated and acted upon his symptoms in his particular social setting. There were those who were ill and yet failed to consult and others who in effect made a practice of consulting their doctor. Since illness was socially acceptable then, there was a tendency for those persons to adopt what Parsons (1951) called the "Sick Role"; to relinquish their responsibilities with valid reason for social failure. He considered that it was incumbent upon doctors to avoid producing iatrogenic illness and making these people dependent and hypochondriacal. However, in the field of psychiatry, where diagnoses were made upon behavioural and social disturbances it was often difficult to separate off from the different cultural patterns of expression, affect and behaviour found at different social levels. The question then arose as to which were symptoms of real illness and which were non-medical factors leading to medical intervention.

Evidence for the concept of "illness behaviour" came firstly from the studies of cultural and learning effects. Thus it was known that different ethnic groups reacted to pain and sought relief from pain, both in responses to an attitude questionnaire and by laboratory tests, to different degrees; furthermore, their usage of medical services varied. It had also been shown that boys were more stoical than girls and older children more stoical than younger. The second type of evidence

derived from studies of behaviour as a coping response to situational difficulties. Mechanic considered that whereas an emotional component had been indicted in the aetiology and precipitation of illness, it was less well appreciated as a reason for seeking medical attention. He believed that the "distress" was more influential in its effects upon seeking help than the condition actually presented. Using Parson's notion of illness as a mode of response to social pressures and a means of evading social responsibility, Mechanic and Volkart (1961) examined the health records of 600 university students in order to correlate measures of stress, the tendency to adopt the sick role and the frequency of attendance at the university health service. Perceived stress, measured by indices of loneliness and nervousness, and illness behaviour were both related to the use of the health service over a one-year period. Further in the group with a high inclination to use medical services, stress was a rather significant influence in getting people to the doctor. It appeared, therefore, that those inclined to adopt the "patient role" practised this method of coping more often than those not so inclined. Up to a point it was found that social and demographic factors were the best predictors of the use of medical care but that with increasing severity these factors lost their importance and "biological" factors operated. Mechanic's theory properly emphasised social factors in illness and its presentation but it has not yet been found possible to combine his findings with those of the biological theories. If his group, with high inclination to use medical services, coincides with the

group especially prone to illness of all kinds, described by Hinkle and Wolff, then doctors will not be reinforcing "immature patterns of learning" by treating them. Should however, frequent attenders and the truly ill be different types of people, then a radical rearrangement of the medical services is required.

Conclusion

In conclusion, it would appear from the weight of evidence that illness is the result of a complex interplay between social, psychological and biological factors. It follows therefore, in the practice of medicine that not only must the disease be treated but also the patient. This consideration enables the patient to be approached holistically. Although there is evidence, often anecdotal, that mental illness can follow a physical disease the case for the psychogenesis of physical disease is more tenuous. Demonstrating that stress can produce physiological changes is one thing but to produce clear evidence of structural pathology is quite another matter. Present knowledge suggests that stress can aggravate and perpetuate an organic lesion but not evoke it.

The view that emotional and physical changes are both parallel responses to stress, without necessarily any causal relationship between them, is one which offers a line of research free from the rather unproductive debate about genesis. Thus stress may produce alterations in mood, thought and behaviour or disturbances of bodily function and structure, through failure of adaptation. This view is based upon the theoretical concepts of Selye (1956) with his notion of a "general adaptation

syndrome" to meet internal and external stress mediated through the endocrine and other bodily systems. This concept reflects a concern, however, with organ and tissue responses rather than the co-existence of physical and psychiatric illness in the community at large. It is the purpose of this study to test out the hypothesis that the two types of morbidity are coincident.

Chapter Three

Aims and Design

Aims

1. To examine the reported association between physical and psychiatric disorder, at a screening survey, by comparing the distribution of physical disease in an identified psychiatric sample with that for a demographically matched psychiatrically normal control group.
2. To determine whether there are sub-groups within the general population who demonstrate this association to an exceptional degree or in relation to particular physical disorders.
3. To compare the degree to which the psychiatric and normal samples suffer from "psychosomatic disorders".
4. To consider the types of psychiatric syndromes distributed throughout a random sample of the general population.

Design

Since the patients were drawn from a general practice population, there were several central considerations in designing the project. A suitable practice had to be found with co-operative general practitioners and facilities for examination purposes. A means had to be devised for isolating a psychiatric group and a control population. A thorough physical profile of illness was needed on each patient and this examination had to be carried out by someone other than the psychiatrist. The physical assessment had to be directed not only to manifest

illness but had to measure such objective indices of health as chest X-ray and blood chemistry. It was further of paramount importance that the physical and psychiatric examinations should be carried out separately and by different people, and it was equally important that they should take place on the same occasion. Psychiatric assessments should be carried out by trained psychiatrists and the physical assessment based upon examinations by the general practitioner and screening data.

1. Obtaining a General Practice

It was convenient to the study that the Social Medicine Department of St. Thomas's Hospital was establishing a health screening survey for the Ministry of Health. The department's aim to investigate the feasibility and the clinical and economic effects of screening differed substantially from the aims of the present study, but the overall design permitted joint use of the material for both projects which were carried out at the same time.

The survey team had agreed with the Ministry of Health to adopt a screening procedure with clearly defined criteria. It was decided to screen the age group most subject to chronic disorders in a general practice population. People between the ages of 40 and 64 were included.

2. The Physical Examination

The survey was divided into three parts with the first two taking place at a Health Centre and the third, a fortnight later, at the surgery. Patients completed a questionnaire and then screening tests were carried out by trained ancillary staff.

Finally there was a physical examination by the general practitioner.

3. Defining the Psychiatric Sample

Since the aim of the study was to determine whether psychiatric cases suffered more physical illness than psychiatrically normal people, it was necessary to isolate a psychiatric sample and obtain a Control group from the same population.

The work of Shepherd et al (1966), in their general practice survey, suggested that in a London general practice a prevalence rate of about 14% for psychiatric disorder might be expected. The 2,000 people eligible for screening would include a substantial number of psychiatric patients. Whilst it was recognised that there is no complete substitute for a clinical interview in assessing psychiatric cases, it would still not be possible to interview 2,000 patients in the time available. It was necessary, therefore, to use a primary screening technique to separate off potential psychiatric cases. Only a proportion of the potential cases could be interviewed but prevalence was not being studied and it did not matter, therefore, if a few cases were missed. A questionnaire was used to screen all the patients initially and only high scorers proceeded to clinical interview.

The Control group, drawn from the same population, consisted of an equal number of low scorers, matched for age, sex, marital status and social class. Those people scoring nought on the twenty psychiatric items of the questionnaire were sampled. The characteristics of the Index group, because of the matching procedure, governed those of the Control group. This

choice of a Control sample seemed more satisfactory than using the whole population as Controls. Although it was always understood that a substantial number of cases needed to be collected to show differences between Index and Control groups, this had to be balanced against the time available for interviewing. If only potential psychiatric cases and no Controls were interviewed it was clear that 200 - 300 cases could be obtained. But without interviews the nature of the Control group would be uncertain and might contain a large proportion of unidentified psychiatric cases. The same argument held for the further possibility of using all those who scored nought on the questionnaire as Controls, since it could not be guaranteed that all nought scorers were normal. An analysis of previous findings using the screening instrument showed that 10% of psychiatric cases scored nought on the 20 psychiatric items from the questionnaire.

The most suitable design which emerged was that which involved interviewing all the Index and Control cases. So whereas the screening instrument placed patients into broad categories of potentially psychiatric and potentially normal, the final classification was made at clinical interview. It was assumed that psychiatric morbidity was continuously distributed throughout the population and that the screening instrument would roughly demonstrate the presence or absence of morbidity. When the screening instrument was set at a pre-arranged threshold it would isolate a proportion of the psychiatric cases above the threshold; conversely the majority of the nought scorers were

likely to be normal and those scoring between nought and the threshold were a mixture of cases. Another reason for only interviewing high and low scorers was to maximally increase the psychiatric variance between Index and Control groups. Since the screening instrument was not a perfect case-finder, it was clearly understood that there would be some misclassification and that some time would be wasted because of this. An important feature of the design was that all the interviews were to be carried out by the same person, the author, thereby making any observer bias consistent.

Within the time set by each screening session, the chosen design, although limiting the number of Index cases, enabled proper examinations to be made of the psychiatric and normal cases. It consisted of isolating psychiatric and matched Control samples, initially with a questionnaire, then confirmed by clinical interview, and comparing the amount of physical illness in the respective groups.

Chapter Four

Method

This chapter is concerned with the features of the general practice where the screening took place, the characteristics of those being screened, the screening procedure and details of the means by which the results were obtained.

1. Features of the Practice

The survey took place at St. Paul's Cray, situated in the London Borough of Bromley, where the co-operation of a group practice had been obtained. In the practice there were four full-time general practitioners, three male and one female, and one female doctor who worked part-time. They had no special orientation towards psychiatry but were enthusiastic about participating in research and had undertaken research projects in the past. There were 12,000 patients on their lists and generally, except in the case of an emergency, the practitioners saw people exclusively from their own lists. They kept an appointment system and encouraged families to register with one practitioner. The surgery was situated in the middle of a housing estate and had at least one consulting and examination room per doctor. The building was spacious and one room was turned over to the survey team for use as an office and records centre. The atmosphere was friendly and co-operative.

2. Characteristics of the Patients eligible for Screening

It was decided that only age-groups subject to chronic disorders should be screened, i.e. patients between the ages of

40 and 64. Examination of the National Health Service cards showed that in this particular practice, during the summer of 1967, there were approximately 4,000 people who came into this age range. At the same time it was recognised that because of delays in Executive Council procedure, names would still be on the lists when patients had removed or had died, and that new individuals would be added to the list during the period of survey. It was decided that the number of people who had removed or died should be checked during the study and new patients should be admitted to the study. Since the Social Medicine department wished to have Index and Control groups in order to compare the value and effects of screening, the 4,000 persons eligible for screening were randomly divided into a group for screening and another which would be managed in the customary manner for the practice. Random allocation was made on the basis that both members of a couple should be invited, rather than cause difficulties by only inviting one person from the family.

The surgery was situated in the middle of a housing estate and the majority of the patients lived in council houses on the estate, although some came from private dwellings in the area. Thus, 90% of the patients lived in council property and had largely come to the district from central London boroughs through an overspill scheme. Most of this group had been born and bred in London and had been rehoused during the fifteen years the estate had been in existence. A small minority had originally come from elsewhere in the United Kingdom or from continental Europe. Most people worked locally in light industry

although some men had retained their previous jobs and commuted to central London. Two-thirds of the women worked either in a full or part-time capacity. The larger proportion of the population were in the skilled artisan class.

3. Screening Procedure

The sessions took place in a health centre separate from the surgery but centrally situated on the estate. It contained a large hall with a reception desk and numerous small rooms situated on two floors. The building was satisfactory for such a survey, since some of the rooms communicated and this permitted a steady flow of patients from one screening post to the next. All the posts were situated inside the building except for the X-ray, which was held in the usual mass miniature X-ray van outside.

During the nine-month period taken to complete the survey, sessions were held twice weekly, mainly in the evenings. Some 40-60 patients attended the Health Centre each week. They attended a session at a pre-arranged time and were given a full screening. Each patient was sent a letter, signed by his general practitioner, two weeks before his provisional appointment. The purpose of the screening and what would be required was explained. A business reply envelope was included and on the receipt of this a definite appointment was made. If no reply was received a reminder was sent 7-10 days later. The screening sessions were held mainly in the evenings to enable working people to attend, although afternoon sessions were occasionally arranged for women.

The procedure was divided into four parts with the first three taking place at the Health Centre and the last at the surgery at a later date. They were:

- i. The completion of a self-administered questionnaire.
- ii. Psychiatric Interviews, wherever necessary, were carried out at this stage by the author.
- iii. Physical screening tests carried out by trained ancillary staff.
- iv. Physical examination by the general practitioner.

i. The Questionnaire

Every patient was given a questionnaire to complete. It consisted of items related to physical health and 20 exclusively psychiatric items included for the purpose of this survey (see appendix 1). These last items were taken from the Cornell Medical Inventory and used as the initial psychiatric screening instrument.

a. Items selected for questionnaire

An analysis of the C.M.I. results of both normal and psychiatric patients from the Shepherd study was carried out to determine which items discriminated most. It was decided that although the discrimination was not very satisfactory, it was possible to use the 20 best discriminators as a primary screening device and that they could be incorporated as part of the questionnaire. The mean score for normal people was 1.89 with a standard deviation of 1.76 and for psychiatric patients the mean score was 2.8 with a standard deviation of 2.1. Ten per cent of the psychiatric cases scored '0' on these questions and 90% of the normals scored positively on 4 or less items. The

failure of the C.M.I. to discriminate clearly between the two groups was demonstrated by Shepherd et al (1966) who showed that, when the C.M.I. scores were expressed in cumulative form, "while the C.M.I. differentiates quite well between the psychiatric out-patient group and the general practice 'normals', the general practice patients occupy an intermediate position; they are, in fact, closer to the 'normals' than to the out-patients. This suggests that the general practice cases constitute a milder group than those referred to psychiatric out-patients' departments, an inference supported by the fact that most general practitioners refer to hospital only a fraction of their identified neurotic cases."

The 20 best discriminators were then placed in the survey questionnaire and it was decided that any person scoring above a threshold score would proceed to clinical interview. The limitations of this procedure were firstly, that during any one screening session it was only possible to see a limited number of patients and, secondly, the C.M.I. items would not discriminate in a linear fashion, with high scorers being severely ill and low scorers being normal. Thus, it was necessary to set a threshold which enabled all high scorers to be examined at any one session, since it was not thought expedient by the general practitioners to interview them at a later date. At the same time it was accepted that the procedure would not be a prevalence study, for the reasons that sub-threshold scorers might have a psychiatric disorder and that a proportion of the population would refuse to be screened.

b. The Control Sample

The Control sample had to be drawn from the same population as the psychiatric sample and shown to be free from psychiatric disorder. The total population screened could not be used as a Control group since it would contain a proportion of unidentified psychiatric cases. However, the analysis of the C.M.I. items (vide supra) had shown that only 10% of the general practice psychiatric cases scored nought, so it was decided to obtain the Control group from nought scorers in the present study. Thus, in order to maximally increase the variance between the Index and Control samples, only high and low scorers were given a clinical interview in order to assess their psychiatric state. Since 20% of the general practice psychiatric patients scored on 5 or more items and 90% of the normals scored below this figure, it was considered that this would be a useful threshold and would produce a sufficient number of psychiatric cases for the interviewer to cope with at any one session. An equal number of interviews had to be devoted to the Control group but since so many people were liable to score nought, this group had to be sampled. It was accepted that some of the interviewing time would be spent on false positives and false negatives because of misclassification by the questionnaire.

c. Matching Procedure

The Index and Control cases were matched by sex, age, marital state and the Registrar-General's Classification of Social Class. It was not necessary to seek a match for an Index case immediately during a screening session since the population

was relatively homogeneous, all being between 40 and 64, mostly married and social class III. Thus, most cases were matched easily as the survey proceeded, although in some instances, such as with single or widowed people, it was difficult to find appropriate controls.

ii. The Psychiatric Interview

When a patient scored on 5 or more items of the psychiatric section of the questionnaire a clinical interview was given. A random sample, but equivalent number, of nought scorers was similarly interviewed. The interviews took place in a quiet room at the Health Centre. The patients were not told the nature of the interview, nor that the interviewer was a psychiatrist. The interviews were framed in such a way that the patients were led to accept them as a means of discussing their general health. At no time were aspects of management discussed with the patient. The interviews lasted up to forty minutes for Index cases, though less for controls.

Since the session lasted from 6.30 - 9.30 p.m. only, it was not possible to see more than a limited number, so emphasis was placed on seeing as many high scorers as possible. The general practitioners would not agree to people being seen in their homes, as they regarded it as an intrusion into privacy, so all interviews were held at the Health Centre.

It has been noted before that observer bias would be consistent because the same interviewer would carry out all the interviews. However, it was considered that the bias would be minimal since the interview schedule, devised and calibrated by

the General Practice Research Unit, has a high inter-rater reliability (see appendix 2). The author took part in the reliability study and there was, therefore, confirmatory evidence that his assessments would have a high degree of reliability.

The Clinical Interview Schedule (Goldberg et al, 1969) is divided into two sections, the first of which is unstructured, dealing with the patient's present illness and past history, while the second is semi-structured and is concerned with the symptoms the patient has noticed in the previous week. The ten following commonly encountered psychiatric phenomena are rated, according to frequency and severity on a 5-point scale. Somatic symptoms related to psychological phenomena, fatigue, sleep disturbance, irritability, lack of concentration, depression, anxiety, phobias, obsessions and depersonalisation. At the end of the interview the psychiatrist then rates manifest abnormalities noted, during the interview on twelve 5-point scales. These are more complete than the symptom ratings and range from depression and morbid anxiety to rarer phenomena like delusions, hallucinations and intellectual impairment. The clinical schedule has been devised for use in a general practice setting but has been tested in a variety of clinical situations from general practice patients to in-patients in mental hospitals. The inter-rater reliability, using a three-way analysis of variance which compared the between-patient mean square with that for interaction between patients and doctors has been calculated as +0.919. Finally, the psychiatrist gives an overall clinical rating and a diagnosis from the International Classification of

Disease (1968). The rating assessment is on a 5-point scale and ranges from 'normal' (rating 0) and 'minor abnormalities' falling short of clinical significance (rating 1) to three degrees (ratings 2, 3 and 4) of definite clinical disturbance. These three degrees are called mild, moderate and severe illnesses respectively, and cover a spectrum ranging from cases just clinically disturbed to those who warrant referral for psychiatric in-patient treatment.

In every case the assessment was based upon the psychiatric state at interview. The past history was noted but was not considered sufficiently reliable for other than two purposes:- to find the concordance between psychiatrist and general practitioner as to whether the patient was a psychiatric case at present or had ever been so in the past; and to exclude nought scorers from the Control group, whether or not they were well during the screening period, if there was evidence that they had had a psychiatric illness in the past.

Since the psychiatric assessment was carried out prior to the completed physical assessment there was no prior knowledge about physical illness of patients.

iii. The Physical Screening Examination

When the patients arrived at the Health Centre, personal details were recorded, by a receptionist, at the front of the two special booklets. The patient then proceeded to the X-ray van outside and had a chest X-ray. If, however, they had had a recent film taken, and the result was known, then this part was waived. On their return they were given one of their booklets

and asked to complete the questionnaire. They sat at tables in the reception hall and ringed the answers 'Yes' or 'No', whichever was appropriate. The questionnaire consisted of 40 items related to physical and psychiatric symptoms, 14 related to smoking and drinking habits (all from the Social Medicine Department) and a further 20 exclusively psychiatric items added for the purpose of this study. The physical check list (see appendix 8) looked for visual and hearing difficulties and disorders in the cardiovascular, respiratory, musculo-skeletal, urinary and intestinal systems.

After completing the questionnaire, the patient moved on to the second phase where the objective screening tests were carried out. There were 9 screening posts operated by trained personnel, all of whom were women and whose training was in professions ancillary to medicine. Prior to the start of the screening they had been given extensive training in the use of the equipment. The posts were in different rooms and it was the convention for the patients to follow certain routes around the Health Centre. They normally moved around the posts as follows: height and weight, respiratory tests, skinfold, electrocardiogram, blood pressure (all downstairs), then vision tests and audiometry upstairs, finally returning downstairs again for blood tests. It was possible to permutate and go upstairs first but on no account could the blood tests precede the blood pressure being taken. The screening posts were as follows:-

1. Chest X-ray

Each patient had a chest X-ray in the mass miniature radiography van parked outside the centre. The services of a

fully-trained radiographer were used. The films were read by a consultant radiologist. Exception was made for those people who had had a recent X-ray and where the result was known.

2. Measurement of Height and Weight

Height was measured to the nearest inch, with women taking off their high-heeled shoes.

Weight was measured to the nearest pound, with coats and jackets removed.

3. Skinfold

The 'Harpenden Skinfold Calipers' were used for this test, a vertical fold of skin being held lightly between fingers and thumb during measurement. The triceps were measured halfway between the acromial process and the olecranon and the sub-scapular region one inch below the angle of the scapular. Two readings were made in each area and they had to agree to within 0.4 mm. Failing this, further readings were made (maximally five) until closer agreement was made.

4. Ventilatory Function tests

The purpose of these tests was to obtain several objective measures of respiratory function. These were Peak Expiratory Flow Rate (P.E.F.R.), Forced Vital Capacity (F.V.C.) and Forced Expiratory Volume in one second (F.E.V.1). Lung function was always measured in the same order as above and the patient was sitting.

Peak Expiratory Flow Rate

This variable is the maximal rate of flow of air during respiration, and, although it only occurs over a fraction of a

second, it is expressed in litres per minute, as if the peak flow continued over a more prolonged period. The patient was shown how to expire fast into the Wright Peak Flow Meter. Five measurements were made and the mean of the last three accepted as the final score.

Forced Vital Capacity and Forced Expiratory Volume in one second

These tests measured the total volume of air expired and the volume of air expired in the first second of a forced expiration respectively. The instrument used was the dry spirometer developed by the Pneumoconiosis Research Unit. The patient was told to breathe deeply and to blow all the air out until none was left. Three recordings were made to the nearest 50 cc. and the mean calculated.

5. Electrocardiogram

For this investigation patients lay on a couch stripped to the waist, and electrodes were attached to each wrist and ankle. A multichannel cardiogram with twelve lead tracings was used. Firstly, a calibration trace was made, then limb and chest recordings. A Rose Caliper ensured that the base line on the chest was one inch below the xiphisternum.

The E.C.G. findings were coded by means of the Minnesota Coding Scheme which relates the electrical recordings to the type of cardiac pathology.

6. Measurement of Blood Pressure

The Systolic and Diastolic (1 and 2) blood pressure readings were recorded. It was accepted that systolic was when sounds appeared, diastolic '1' when sound became muffled and '2'

when they disappeared. The Garrow variable zero sphygmomanometer was used since it is designed to reduce the effect of observer bias and terminal digit preference. Thus, when the cuff pressure is at zero the level of mercury may vary from zero to 80 mm. according to the position of an eccentric wheel which controls the capacity of a large mercury reservoir. When taking the blood pressure the observer does not know the zero value until after recording the point of appearance and disappearance of the sounds. The zero value which is found is then subtracted from the diastolic and systolic pressures recorded. The patients sat during the procedure. Two recordings were taken for each value and the mean calculated.

7. Vision

Examination of distant and near vision was made using Snellen's chart, pin-hole lens and Jaeger's reading card. The room used at the Health Centre was where tests of vision normally took place so the lighting, equipment and distances were eminently satisfactory. A separate examination of the eyes was made with the Friedman field screener in order to determine whether there were localised areas of defective vision and to assess their severity. Such lesions might be found in glaucoma and diseases of the lens and retina. The procedure took place in a dark room, examining one eye at a time. The person had to fix on a central point and state the number of peripheral lights that could be seen. If vision was normal then this was stated in the booklet, whereas if lesions were elicited then a composite chart was made out.

8. Audiometry

Each patient had a hearing test carried out in a quiet room. Firstly, they were given a sweep test at 30 decibels and 1,000 cycles per second. If this was heard then hearing was checked at frequencies between 250 and 8,000 cycles per second. Any failures were recorded and if there were two or more failures on one ear a full audiogram was carried out. This consisted of discovering the threshold of hearing at each frequency.

9. Blood Tests

Each patient had 20 cc. of blood removed for the following estimations:-

Haemoglobin, Packed Cell Volume, Mean Corpuscular Haemoglobin Concentration, and blood film.

Blood Urea.

Random blood sugar.

Blood Uric Acid.

Serum Cholesterol.

Protein bound iodine.

These specimens were sent to the laboratory at Orpington Hospital for estimations to be made. Every 10th specimen was duplicated to check the reliability of the laboratory procedures.

Before leaving, the patient was given a container and instructions to place a specimen of stool in it. A stamped addressed envelope was given to send the specimen to the laboratory.

iv. Physician's Examination

The third phase of the screening took place two to three weeks later at a time suitable to the patient and the family doctor. The examination was carried out at the surgery and lasted about thirty minutes. The information was written in the second of the special booklets prepared for the survey. Firstly, the doctor made a note of previous illnesses, both by checking through the records, and directly by asking the patient questions pertinent to the various body systems. He then carried out a basic examination of the mouth, teeth, skin, hair, nails, abdomen for herniae, joints for arthritis, legs for varicose veins, and in women, the breasts were examined for lumps and a full gynaecological examination made. Following this, the practitioner was guided by the results of the first and second part of the screening. Should it be evident from the questionnaire and the objective tests that an abnormality was present in one or more systems then he proceeded to further examination of these. The criteria for further examination, investigation and diagnosis of physical conditions are given in Appendix 3.

Results

All the conditions from which the person suffered were finally placed at the back of the second special booklet. It was stated whether the condition had been previously known to the general practitioner or if it had been discovered or become known to the doctor as a consequence of the screening survey. Thus, all the data collected on each patient were placed in the two special booklets and available for coding.

When the booklets were completed on each patient, they were stored at the surgery in special boxes according to alphabetical order and general practitioner. The data were then transferred to a special transcript preparatory to coding. The transference of data was carried out with no foreknowledge of whether the case was psychiatric or normal. A secretary compiled a list of names with Index and Control cases distributed throughout it. Surgery attendances for one- and five-year periods were also collected from the Executive Council records.

Chapter Five

RESULTS

The Screened Population

Examination of the Executive Council Cards showed that 2,075 people were eligible for screening and all of these were sent an invitation, and if necessary a reminder, to co-operate in the screening survey. The number responding to the invitations was 1,461 (70.4% of the total) and consisted of 711 males and 750 females. The survey ran for 9 months from mid-October 1967 to mid-July 1968, during which time 74 screening sessions were held. This response rate compared well with that achieved by the Bedford survey for diabetes (1962) where 67% gave a urine sample and 78% of this number were willing to attend for a glucose tolerance test. Knox (1968) has concluded from studying surveys, for all types of morbidity, that there is a pattern of falling response with age.

The non-responders were largely refusers while the remainder had either left the practice or were not contactable. The non-responders comprised 20% who refused the invitation for screening and 10% from whom no answer was received. There was no evidence to suggest that there were broad differences between the responders and non-responders.

All those admitted to the screening survey completed the questionnaire which comprised the first part of the procedure. This high standard was maintained by the receptionists, even though in the case of two illiterates the questions had to be read out to them. This meant that responses to the 20 questions

extracted from the Cornell Medical Index were obtained on all the 1,461 people who were screened. The purpose of these questions was to act as an initial psychiatric screening instrument for distinguishing potential psychiatric cases and potential normal Controls. Consideration of previous general practice responses to these questions had shown that whereas less than 10% of non-psychiatric cases scored positively on 5 or more of the questions, 20% of the psychiatric cases in general practice did so. It was accepted that for operational purposes, this was a useful threshold.

The arrangements for the screening survey imposed their own peculiar difficulties upon the selection of the psychiatric cases and the Control patients. First, all interviewing had to take place during a 3-hour period at the Health Centre and no cases could be followed up, should they be missed, for a home visit since the general practitioners frowned upon such an activity. Second, there was no means of predicting how potential cases would emerge during any one session. This meant that on some occasions there were too many cases to interview during the time available and on others no cases at all. Every effort was made to see every case. Only one session was missed and this was due to the interviewer being ill. Third, time was also required for interviewing the normal Controls who were drawn from the nought scorers. It was early realised that coincident matching could not be achieved, but because the population had a narrow age and social class range it was clear that retrospective matching would mean little wastage of subjects. So the

psychiatrist interviewed as many of the potential psychiatric cases and controls as possible in the time available to him. The final number of cases employed for the purpose of this study emerged as follows.

Male Index Cases and Controls

Index Cases

Fifty eight males (8.2% of those screened) scored on 5 or more of the psychiatric items. Of this number 51 were interviewed. It was not possible to see 6 male high scorers and a further individual was older than 65. People were invited as couples and this sometimes meant that one partner was older or younger than the age range of 40-64. In order to avoid problems with matching it was decided to exclude those outside the age range. Of the cases interviewed 41 turned out to be suffering from a psychiatric disorder. This was 5.8% of the total number of males screened.

Control Cases

426 males (60% of those screened) scored nought and, by random selection, 52 of these were interviewed. It was decided prior to the screening that in order to maximise the variance between the Index and Control groups only entirely normal people would be admitted to the Control group; and even those with personality traits (rating 1 on the Clinical Schedule) would be excluded from the Control group. By the same criterion those normal at interview but with a past history of psychiatric disorder were also excluded. Only 48 of the 52 interviewed were strictly normal and a further 2 had a previous history of

psychiatric disorder. When the Index and Control groups were matched by age, sex, marital state and social class the result was 37 matched pairs. Three index cases could not be matched and 1 Index case defaulted.

Female Index Cases and Controls

Index Cases

184 females (24.5% of those screened) scored on 5 or more of the psychiatric items, and 149 of these were interviewed. Twenty three potential cases were not seen and 12 were too young. 121 females were found to be psychiatrically ill. This was 16.1% of the total women screened.

Control Cases

267 females (35.6% of those screened) scored nought and 117 were interviewed. Seven of these were not strictly normal at interview and a further 13 were normal but had a past history of psychiatric disorder. Final matching produced 87 pairs, 33 Index cases could not be matched and 1 Index case defaulted.

A total of 369 interviews was carried out, 169 to obtain Controls and 200 for the Index cases. The total number of matched pairs was 124. The mean age of the males was 49.9 and the females 49.6. The marital status of the males was 33 married, 3 single and 1 widower, and of the females was 81 married, 5 widows and 1 divorcee. The social class distribution of the cohort of patients is shown in Table 1.

Table 1 The Social Class Distribution of the Index and Control Groups by Sex

Registrar-General's Social Class	Male Pairs (37) %	Female Pairs (87) %
Social Class I	2.7	1.1
Social Class II	5.4	10.4
Social Class III non-manual	16.2	12.7
Social Class III manual	48.6	50.5
Social Class IV	19.0	17.3
Social Class V	8.1	8.0
Total	100.0	100.0
Total patients	37	87

The cohort examined was fairly homogeneous with the majority married and the greater proportion in the manual section of social class III. Only minor and non-significant differences existed between the sexes in respect of social class.

The Cornell Medical Inventory as a Screening Instrument

It is preferable that a screening instrument should have a known validity and reliability. Evaluating these for a psychiatric instrument raises special problems because attempts to measure validity devolve into measures of reliability. In order to measure whether an instrument examines what it is supposed to examine there must be a yardstick. There is no absolute criterion for what constitutes psychiatric illness as there is, for example, in organic medicine where such objective measures as biopsy are

available. Efforts must, therefore, be directed towards the reliability of the instrument. Clinical interview is the most satisfactory method of testing the reliability of a screening instrument; more so if the clinical interview schedule has a known inter-rater reliability. There is the risk of observer bias since it is theoretically possible that foreknowledge of the questionnaire responses could influence the interpretations of symptoms. In this study the risk was minimised by a prior inter-rater reliability study on the clinical schedule and the extensive use of an instruction manual. Further methods of assessing reliability are the patients' understanding of their own psychiatric illness or by comparing the findings with the general practitioner's records. However, patients cannot be expected to have a reliable knowledge of their mental states since it is quite possible that they have not formulated their symptoms in psychiatric terms. The general practice records are a useful criterion but are exposed to error, since the general practitioner may use different standards for diagnosis to those of the questionnaire; he may miss cases, he may assume that the patient has recovered from an illness or the patient may not attend the surgery. Abrahamson (1969) has shown that there is a group of patients who continue to have symptoms following general practice care but no longer attend the surgery. These individuals appear to have made some adaptational response to their illness. The reliability of an instrument is best assessed by interviewing everyone who completes the questionnaire. In this study this was not possible.

Although everybody completed the questionnaire items, confirmatory interviews were only carried out on high and low scorers, and none on those people scoring positively on 1 - 4 items. Thus, any statements on the predictive value of a score are incomplete. Despite this reservation some evaluative judgments can be made upon the usefulness of the C.M.I. as a screening instrument.

First, it is possible to determine the false-positive and false-negative rates for the people seen. Thus, although 51 males were interviewed as high scorers, only 41 were accepted as cases, giving a false positive rate of 19.6%. Similarly for women, 121 out of 149 were accepted as cases, giving a rate of 18.8%. Clearly these figures are dependent upon the level at which the threshold is set, and in this study the level could have been raised without loss of subjects. The rates are better than those of the 1962 Bedford Diabetic Survey, where 30% of those screened were false-positives. The measurement of the false-negative rates has to be seen in the light of the experimental design. Only entirely normal people were admitted to the Control group. Those with psychiatric morbidity, with minor personality traits or with a past history of psychiatric disorder were excluded. In the event, the potential Male Control group included one person with a psychiatric disorder, three with personality traits and two with a past history; the Female group included one person with a psychiatric disorder, six with personality traits and thirteen with a past history. The acceptance of the present mental state as the criterion for

normality gave a false-negative rate of 7.3% for men and 6% for women.

Second, the C.M.I. responses were compared with the results from other populations. In Figures 1 and 2, a comparison is made between the responses for psychiatric out-patients, general practice psychiatric cases, general practice normal attenders and the random sample of the population used in this study. All the patients came from the London Area. The results were expressed as accumulative percentages. There are clear differences between the curves for the various groups, but some allowance should be made for the fact that the items have been extracted in the general practice and out-patient cases. Thus, the out-patients and general practice patients completed the whole 195 item questionnaire whereas the random sample gave responses to the selected items only. The curve for the general practice psychiatric cases is quite distinct from that for the out-patients and tends to parallel that for the normal attenders. Shepherd et al (1966) have stated that this finding is in keeping with the fact that most psychiatric illness is dealt with at general practice level. The characteristics of the random sample curve were different from the other curves. There were substantially more nought scorers than in the general practice groups but conversely there was a small percentage of very high scorers. This curve covered a spectrum from those not attending their doctors to those who received frequent attention.

Third, the C.M.I. responses were compared with the other measures of psychiatric severity. The clinical interview schedule

FIGURE 1. COMPARISON OF C.M.I. SCORES IN
DIFFERENT POPULATIONS - MALES

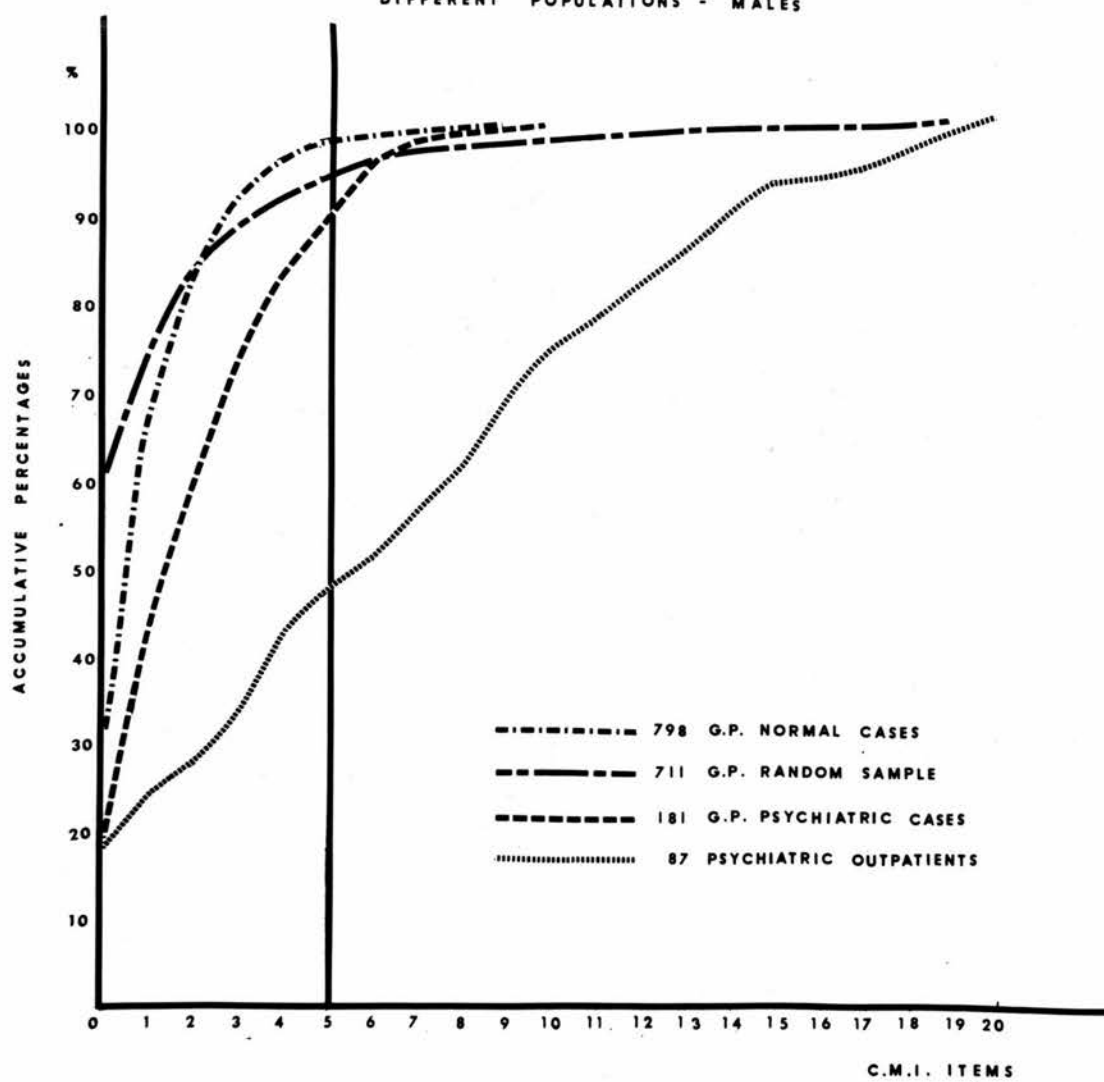
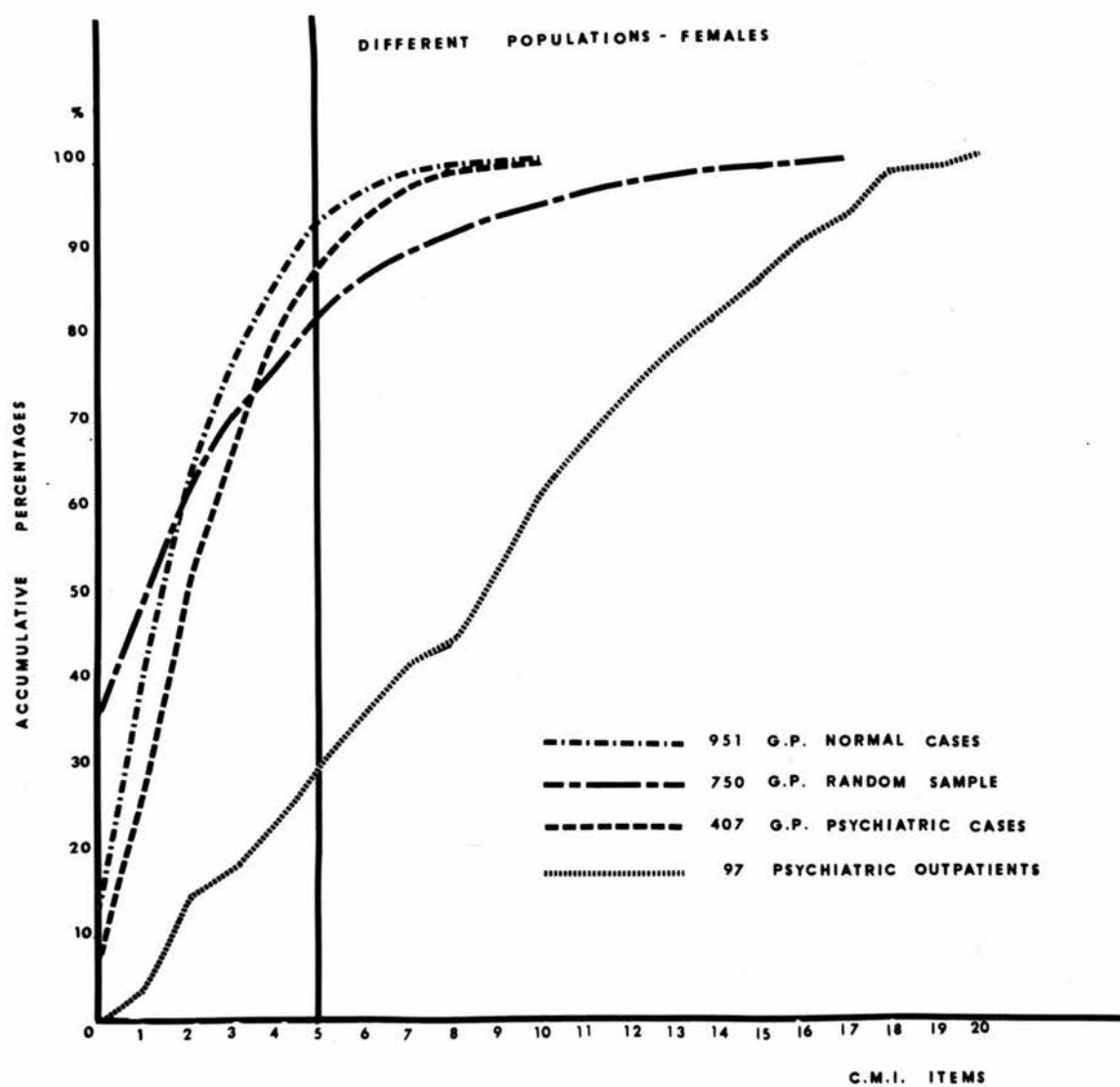


FIGURE 2. COMPARISON OF C.M.I. SCORES IN



provided a symptom profile for each patient and the individual item scores when weighted and summated gave an over-all index of clinical severity. The method of application, reliability and scoring system has been described by Goldberg et al (1969). The best agreement with clinical judgment was obtained from the sum of the 'Reported Symptoms' plus twice the sum of the 'Manifest Abnormalities'. In addition to an overall severity rating derived from summated scores, each patient was given an overall rating by the observer on a five-point scale. A rating of nought indicated no psychiatric morbidity; one, indicated an habitual trait or borderline symptomatology which did not cause distress; two, three and four indicated mild, moderate and severe degrees of clinical severity, respectively. The patients in the Index group scored either on the two or three rating and nobody was given the most severe rating. All the Controls scored on the nought rating.

The mean scores and standard deviations for the three measures of psychiatric severity are shown in Table 2.

Table 2 The Mean Scores and Standard Deviations of the Three Measures of Psychiatric Severity for the Different Sexes and the Total Sample

	Overall Severity Score		C.M.I. Score		Observer Score	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Men (37)	24.4	8.4	9.0	4.4	2.27	0.45
Women (87)	24.24	8.0	9.5	3.4	2.28	0.46
Total (124)	24.28	8.1	9.35	3.7	2.28	0.45

Comparison of the Measures of Psychiatric Severity

The Product Moment correlations between the three measures are shown in Table 3. All are highly significant ($p < 0.001$) except for Observer rating against C.M.I. score for men ($p < 0.05$).

Table 3 Product Moment Correlation Coefficients between the Three Measures of Psychiatric Severity

Index Sample	Overall Severity Score against C.M.I.	Overall Severity Score against Observer	C.M.I. against Observer
Men (37)	0.5365	0.6965	0.3342
Women (87)	0.5166	0.7409	0.5228
Total (124)	0.5199	0.7268	0.4531

The highly significant correlations between the Overall Severity, the Observer and the C.M.I. scores were perhaps related to the fact that on the one hand the Overall Severity and Observer ratings were derived from the same interview schedule and on the other hand the interview questions and the C.M.I. items in some ways resembled each other. The significant correlation between Observer and C.M.I., especially for women, is useful since it indicates that these items from the C.M.I. have some value in screening for severity of psychiatric disorder.

At the same time it should be remembered that 32% of the males and 40% of the females scored between 1 - 4 on the

questionnaire items and no confirmatory interviews were carried out on this group. Similarly only a proportion of the nought scorers were interviewed. Although the C.M.I. has been a useful operational tool in this study it has not been possible to properly evaluate its use for screening purposes.

As a screening device therefore, the modified C.M.I. served a useful purpose and the degree of misclassification did not take up a great amount of interviewing time. Some items tended to have more positive responses than others. Prominent among these were such questions as, "Does worrying continually get you down?", "Are you constantly keyed up and jittery?", "Do you often get spells of complete exhaustion or fatigue?", "Are you considered a nervous person?" and "Do you usually feel unhappy and depressed?". A few of the items might be considered to have psychophysiological significance, in addition to their capacity to distinguish neurotic patients from normals, since they are either hypochondriacal in nature or have some vaguely somatic quality. These descriptions would apply to items 1 - 4 inclusive and item 15. It could be surmised that these items would select out the physically ill and therefore produce a biased sample. It would follow that on these 5 items, those with physical disease would score more often than those without physical disease. This however, was not the case. The 5 items with a possible psychophysiological flavour made up no more than a quarter of the total responses to the 20 items and the ratio of these items to the rest of the items was constant for the patients with physical disease and without. Again, when the

patients who required these items to score above the threshold of 5 positive responses were extracted from the sample, it was found that the mean score for major and minor physical illness did not differ to a significant degree from the means for the rest of the sample.

Thus, whereas all the 20 items from the C.M.I. had been shown to differentiate between neurotic general practice patients and normals some differentiated better than others. However, none of the items were found to have any particular characteristics which might have produced a biased sample.

The Unknown Psychiatric Patients

An interesting feature of a psychiatric screening survey is that it collects cases from the community irrespective of whether they are known to their general practitioner or not. The use of the general practitioner as a case-finder in epidemiological surveys has been based on the understanding that, over a period of time, most patients on a list attend their family doctor, thereby enabling any intercurrent illness to come to his attention. Kessel and Shepherd (1965) showed that in one London general practice approximately 70% of the registered list attended during a one-year period and that during the previous seven years 97% had consulted. There remained 3% of the patients who for 10 years prior to the selected year did not attend their doctor. The one-year findings were in agreement with those of the National Morbidity Survey (Logan and Cushion, 1958) which demonstrated a nation-wide average of 67% of patients consulting over a one-year period. Although no clinical assess-

ment of the non-attenders could be made, Kessel and Shepherd had psychometric evidence that these patients differed, not so much in the amount of minor ill-health suffered, from attenders (although they had suffered fewer serious illnesses) but rather in their attitudes towards medical care. They worried less about their health and were more critical of doctors. Furthermore, their mean scores on the M - R section of the C.M.I. was less than that of a controlled number of attenders, but not to a significant degree.

It has been found in the St. Paul's Cray study that a high proportion of the psychiatric patients were either entirely unknown to their doctors as cases or that they had had a past history but were unknown at the time of the screening. Scrupulous efforts were made to check whether the case was known to the general practitioner, both from survey data and the practice records. If there was no mention of psychiatric illness in these and the patients were not on medication for their mental states it was assumed that they had been overlooked by the general practitioner. No direct questioning was made about a case since it was considered that this might prove embarrassing to the practitioner and the replies not altogether accurate.

It was found that 19% of the men and 27.5% of the women had a psychiatric disturbance unknown to the general practitioner. A further 21.6% of the men and 25.2% of the women were similarly unknown but had had a recognised psychiatric illness in the past. In order to determine whether the characteristics of these patients differed from those known, the mean scores of

the various measures of psychiatric severity were calculated, and compared with the scores of the patients known to the general practitioner. These are shown in Table 4.

Table 4 The Relation between the Three Measures of Psychiatric Severity and the Recognition of the Psychiatric Condition by the General Practitioner

A Psychiatric Condition Known/Unknown to the General Practitioner	Males (37)			
	The Means of			%
	Overall Severity Scores	C.M.I. Scores	Observer Scores	
Unknown	23.4	6.57	2.42	19
Unknown in present but previous history	24.7	8.75	2.12	21.6
Total unknown	24.13	7.73	2.27	40.6
Total known	24.54	9.91	2.27	59.4
Total sample	24.38	9.03	2.27	100.0
B Psychiatric Condition Known/Unknown to the General Practitioner	Females (87)			
	The Means of			%
	Overall Severity Scores	C.M.I. Scores	Observer Scores	
Unknown	22.41	8.66	2.16	27.5
Unknown in present but previous history	21.70	8.09	2.14	25.2
Total unknown	22.1	8.39	2.15	52.7
Total known	26.66	10.71	2.44	47.3
Total sample	24.24	9.48	2.28	100.0

It can be seen from Table 4 that there is a trend, on all the measures of psychiatric severity, except Observer for men, for those with psychiatric conditions unknown at the time of screening to the general practitioner, to have lower mean

scores. The differences between the means were not significant.

In respect of psychiatric diagnoses there were no discrepancies of note between the groups. In keeping with the finding that the more serious disorders were known to the general practitioner, all the affective psychoses had been diagnosed, except for one man who preferred "not to worry his doctor". Again those with obsessional neuroses tended to have been overlooked. This might be expected in a disorder which is often unobtrusive to others. Otherwise the disorders of affect and personality were divided more or less equally between the groups, known and unknown.

Duration of Psychiatric Illness

The three groups were then examined in terms of duration. Although the measurement of duration was not regarded as particularly reliable, since it largely depended upon the patients' memories, some estimate could be made from relating the onset of the psychiatric condition, wherever possible, to an event in the patients' lives. The relation between duration and recognition of the condition by the general practitioner is shown in Table 5.

Table 5 The Relation between the Duration of Psychiatric Illness and the Recognition of the Psychiatric Condition by the General Practitioner

Duration	The Recognition of the Psychiatric Condition by the General Practitioner both at the time of the Screening Survey and previously			
	Never known (31)	Unknown at present (30)	Known (63)	Total Sample (124)
	%	%	%	%
Ill 0-3 months	9.70	3.30	0	3.20
Ill 3 mths- 1 year	12.90	3.30	4.80	6.45
Ill 1-5 years	32.25	23.40	22.20	25.00
Ill 5-10 years	6.45	16.70	11.10	11.35
Ill 10+ years	6.45	30.00	47.60	33.00
Indeterm- inate but at least 1 year	32.25	23.30	14.30	21.00
Total	100.00	100.00	100.00	100.00
Average Duration	3.2 yr	6.5 yr	7.3 yr	6.2 yr

The difference in duration of psychiatric illness between those known to the general practitioner and those unknown was significant ($\chi^2 = 23.47$; d.f. = 8; $p < 0.005$). Thus those patients, never known to him, had an average duration of 3.2 years (2.5 years if the indeterminate group are included) compared with 6.5 years (5.2 years) for those unrecognised, but with a past history, and 7.3 years (6.3 years) for those known to him. This would indicate that time is a factor in the recognition of a psychiatric illness. Clearly other factors must

operate and it was necessary to see whether type of previous history, consultation rates and the diagnostic habits of individual practitioners were influential factors.

Previous Psychiatric History

The accounts of the previous psychiatric history ranged from no past history, to "nerves" and the need for "tonics", to definite illnesses treated by the general practitioner or a psychiatrist. The histories were based upon the patients' statements and the records kept by the general practitioners. The relation between recognition of the psychiatric illness and past history is shown in Table 6.

Table 6 The Relation between Past History of Psychiatric Illness and the Recognition of the Condition by the General Practitioner

Past Psychiatric History	The Recognition of the Psychiatric Condition by the General Practitioner			
	Never known (31)	Unknown at present (30)	Known (63)	Total sample (124)
	%	%	%	%
No past history	26.0	0	0	6.5
Vague account of "nerves"	74.0	0	0	18.5
General practitioner treatment for 1+ illness	0	73.33	54.0	45.2
Out-patient psychiatric treatment	0	10.00	27.0	16.1
In-patient psychiatric treatment	0	16.67	19.0	13.7
Total	100.0	100.00	100.0	100.0

There is a clear relationship between the type of

psychiatric treatment a patient has received and the recognition of the illness by the practitioner. It appears, therefore, that there was a split, probably along the continuum of severity, within the group of psychiatric cases. The more severely ill were being recognised and sent for specialist treatment. Thus 40% of the known men and 50% of the known women had received some psychiatric treatment. A greater proportion of women had been in-patients. It needs to be ascertained whether recognition of illness was related to frequency of consultation and peculiar to any particular practitioner.

The Consultation Rates

The number of occasions on which the patients and their spouses attended the surgery was extracted from the practice records for the previous one-year and five-year periods. They are compared for the known and unknown groups in Table 7.

Table 7 The Relationship between Surgery Attendances and the Recognition of the Disorder by the General Practitioner

Average Attendance	Period in Years	The Recognition of the Psychiatric Disorder, both previously and at the time of the Survey				
		Never known (31)	Unknown at present (30)	Known (63)	Total Index Sample (124)	Total Control Sample (124)
Males	1	3.75	0.83	2	2	1.2
Spouses	1	1.75	1.5	6	4.1	2.18
Males	5	13.5	9.8	15.4	14.0	6.0
Spouses	5	12.0	9.6	19.1	16.3	16.8
Females	1	2.9	3.4	4.8	4.1	1.4
Spouses	1	1.6	1.0	1.7	1.5	1.0
Females	5	17.9	23.5	27.5	24.7	9.0
Spouses	5	12.4	8.8	12.9	11.8	4.5

Any comparisons between the various groups were made difficult by the number of patients on whom there was no information. This was the case because two general practitioners did not keep sufficiently comprehensive records. Also in the case of the widowed and single no information was available for spouses. This loss of data reduced the number of patients in some of the cells to very small numbers. For example, males never known, were reduced from 7 to 4. Any deductions have limited reliability therefore. However, except for the males over a one-year period (which compared very small numbers), the cases known to the general practitioner, and their spouses, tended to consult the doctor more than those unknown to him. The females had consistently higher consultation rates than the men, even in the control groups.

The Control group was included in Table 7 for comparison. There was a consistent trend for the Index group and their spouses to attend the general practitioner more than the Control group. The only exception in this series were the wives of the Male Index cases over five years and here the mean rate was hugely increased by one lady who had had to attend for a series of injections for a physical condition. The most marked difference between the Index and Control groups was found in the females and their spouses for the five-year rate. The findings from this series confirm that neurotic patients, and in particular women, attend more than normal people and that within the neurotic group those patients with a known condition attend the doctor more frequently.

When these results are compared with those of Shepherd et al (1966) there is agreement on some factors. Thus the finding from their Family Health study that neurotic patients and their spouses had higher mean consultation rates than controls was confirmed in this study. (However, it must be emphasised that this does not imply that both Index case and spouse were both neurotic. Although people were invited to the screening as couples only 6 couples out of 124 Index cases were found to be psychiatrically ill.) The mean consultation rates for the 45-64 age group were higher, both for men and women, in the Shepherd study. The explanation for this might be that they were analysing data on a much larger sample and a variety of practices.

Distribution of Psychiatric Patients between Lists

There were five doctors in the group practice, four full-time and one part-time. They had joined the practice at different times and therefore the number of patients on the practice list was not divided equally between them. It was expected that the number of patients in the study sample would similarly be unequal. The division of the patients between the general practitioners is shown in Table 8.

Table 8 The Observed and Expected Distribution of the Index Group, Known and Unknown, and the Control Group between the General Practitioners.

The Observed Distribution of the Index Groups, the Control Group and the Expected Distribution	G.P. 0 %	G.P. 1 %	G.P. 2 %	G.P. 3 %	G.P. 4 %	Total %
Never known to general practitioner (31)	35.4	32.2	9.7	9.7	13.0	100
Known in past but not in present (30)	23.3	23.3	3.4	20.0	30.0	100
Known to general practitioner (63)	41.25	9.5	3.25	27.0	19.0	100
Total Index Sample (124)	35.6	18.6	4.8	21.0	20.0	100
Total Control Sample (124)	20.16	38.70	7.26	16.13	17.75	100
Expected Distribution	24.8	24.7	6.3	24.6	19.6	100
No. of patients on each practitioner's list (April 1968)	2934	2903	743	2901	2313	11,794

General Practitioners '0' and '1' tended to differ from the expected distributions. First '0' had more Index cases than expected and '1' more Controls than expected. The probable explanations for these results are that '0' was a lady doctor and was known to have more females on her list than the others,

(the ratio of females to males in the Index and Control groups was 2/1); and '1' had more patients being screened towards the end of the survey when many of the Control cases were selected. The preponderance of women in list '0' would also serve to explain the excess of unknown cases here since there were more unknown women proportionately than men. The finding was not due to lack of clinical acumen since this practitioner had diagnosed more than her fair share of cases (the known cases). The fact that '1' had more unknown cases and less known cases than would be expected from the random distribution was likely to be due to his disinterest in psychiatry.

Demographic Features

Examination of the demographic features showed differences between the groups. It has previously been noted that proportionately more women were unknown to the general practitioner than men. No age differences were elicited with either sex for the various groups. The groups were different in their social class distributions. These are shown in Table 9.

Table 9 The Relation between Social Class and the Recognition of the Psychiatric Condition by the General practitioner

Registrar-General's Social Classes	Never known %	Unknown at Present %	Known %	Total Sample %
I	3.2	0	1.6	1.6
II	6.4	6.6	11.1	8.9
III (non-manual)	16.1	16.6	11.1	13.7
III (manual)	41.9	40.0	58.8	50.0
IV	22.6	26.6	11.1	17.7
V	9.8	10.2	6.3	8.1
Total	100.0	100.0	100.0	100.0
Total patients	31	30	63	124

Relating the distributions of the three groups to the total sample showed that those known to the general practitioner comprised more social class I and II collectively and less social class IV and V than those unknown to the general practitioner. However, the proportion of social class III (the largest class) was greater in the known group.

Examination of other aspects of the Index patients revealed few differences. Each patient was questioned about family history of psychiatric illness and although this data was not regarded as reliable, 15.3% admitted to formal psychiatric illness in close relatives. There was a tendency for those known to the general practitioner (17.5%) to answer positively to this question than those entirely unknown (12.9%), but not to a significant degree.

The Psychiatric States

At the close of each psychiatric interview the patients were rated on the items of Reported Symptoms and Manifest Abnormalities and then assigned to one or more diagnostic categories. The diagnoses were taken from the Glossary of Mental Disorders (Registrar General, 1968). The possible diagnoses are listed in Appendix 4. Although there were 14 of these, in the event only 7 were used. This was indicative of the problem of applying a psychiatric classification designed to cover the whole spectrum of psychiatric disorder to patients in general practice. The types of disorder found in practice are, in the main, the neuroses, personality disorders and psycho-social difficulties. At present, it is only possible to formally

describe illness in the community under these broad categories, since no refined and widely accepted classification of these minor disorders is available. The distribution of the psychiatric diagnoses among the Index sub-groups is shown in Table 10.

Table 10 The Psychiatric Diagnoses, by Age and Sex, expressed as the Percentage Proportions within Each Group.

Psychiatric Diagnoses Primary(P)-Total 124 Secondary(S)-Total 56		Male Cases			Female Cases		
		40-52	53-64	Total	40-52	53-64	Total
		yrs %	yrs %	%	yrs %	yrs %	%
Affective Psychosis	P	12	8.3	10.8	3.5	3.3	3.4
	S	0	0	0	0	0	0
Anxiety Neurosis	P	36	50	40.5	47.3	36.7	43.7
	S	0	0	0	3.6	0	2.6
Phobic Neurosis	P	0	0	0	1.8	3.3	2.3
	S	0	0	0	25.0	20.0	23.7
Depressive Neurosis	P	32	41.7	35.2	38.6	56.7	44.8
	S	15.4	0	11.1	0	0	0
Hypochondriacal Neurosis	P	8	0	5.4	5.3	0	3.4
	S	15.4	20.0	16.7	53.6	60.0	55.3
Obsessional Neurosis	P	4.0	0	2.7	3.5	0	2.4
	S	15.4	0	11.1	10.8	10.0	10.5
Personality Disorder	P	8.0	0	5.4	0	0	0
	S	53.8	80.0	61.1	7.0	10.0	7.9
Total Primary Diagnoses		25	12	37	57	30	87
Total Secondary Diagnoses		13	5	18	28	10	38
Total Patients		25	12	37	57	30	87

Each Index patient was given a psychiatric diagnosis, and half the sample had an additional diagnosis. Examples of these were anxiety or depressive neurosis with hypochondriacal neurosis or personality disorder; and anxiety state with phobic anxiety. The distribution of the psychiatric disorders differed

between the sexes. The men had an excess of affective psychoses and personality disorders and conversely the women had more depressive neurosis, hypochondriacal neurosis, anxiety neurosis and all the cases of phobic neurosis. Men had significantly more personality disorders ($\chi^2 = 14.26; 1 \text{ d.f.}; p = 0.001$) than the women. Examples of diagnoses, with case histories, are given in Appendix 5.

Symptom Profiles

A further method of describing the psychiatric disorders found in general practice is the symptom profile. The items in the clinical interview schedule are divided into 10 for Reported Symptoms and 12 for Manifest Abnormalities. From the ratings on these items it was possible to build up a profile for each patient. This provided an opportunity to determine whether age and sex affected the presentation of this type of neurotic disorder. The mean scores for each item, by sex and age, are shown in Figures 3 and 4.

For Reported Symptoms, sex differences appeared as follows:- the women had significantly higher mean scores on sleep disturbance ($Z \text{ test} = 2.970; p = 0.01$) and phobias ($Z \text{ test} = 3.4302; p = 0.01$) and a trend towards higher mean scores on somatic symptoms, fatigue, anxiety and depersonalisation; whereas men had a significantly higher mean score on obsessions ($Z \text{ test} = 2.666; p = 0.01$) and a trend towards higher mean scores on irritability, lack of concentration and despondency. Age differences only appeared in a few items but not significantly.

For Manifest Abnormalities, sex differences were as

follows:- women had a significantly higher mean score for excessive concern with bodily function (Z test = 2.26; $p < 0.05$) and no female scored on elated, flattened, delusions, hallucinations and intellectual impairment; men had significantly higher mean scores on slow (Z test = 2.046; $p < 0.05$) and misinterpretations (Z test = 4.3478; $p < 0.01$) and had a trend towards a higher mean score on depressive thoughts. The mean scores for depression, anxious and histrionic were substantially the same. No consistent patterns appeared for age.

Although the diagnoses from the International Classification of Disease and the Symptom profiles were inter-related, the latter provided a more explicit description of the disease complexes found in general practice. The clinical picture provided is helpful in several ways. First, it indicates to the epidemiologist which symptoms are prominent in the minor mental disorders and how they appear to differ between the sexes. Second, it helps provide an understanding of why middle-aged women have an excess of psychiatric illness over men. It has been shown in Figures 131 and 4 that women have higher mean scores on somatic symptoms, fatigue, sleep disturbance, reported anxiety and excessive concern with bodily functions. The quasi-physical symptoms among these are probably more likely to take a person to her family doctor than the items of irritability, lack of concentration, despondency, depressive thoughts and obsessions which the men had in excess. This is clearly only a partial explanation since consultation rates may depend upon attitudes and patterns of behaviour.

FIGURE 13
 Mean Scores of Reported
 Symptoms for 37 Male
 and 87 Female Index Cases

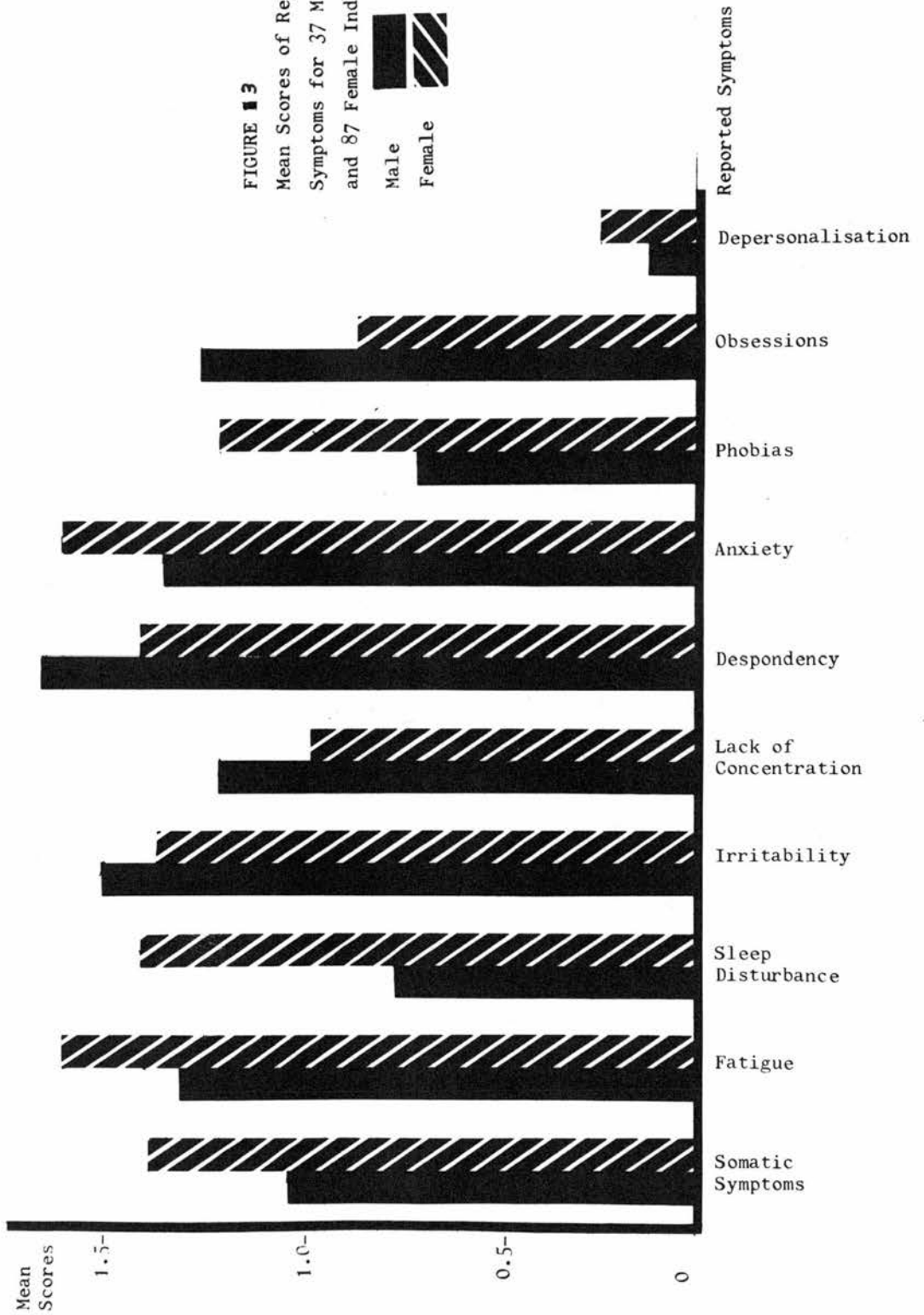
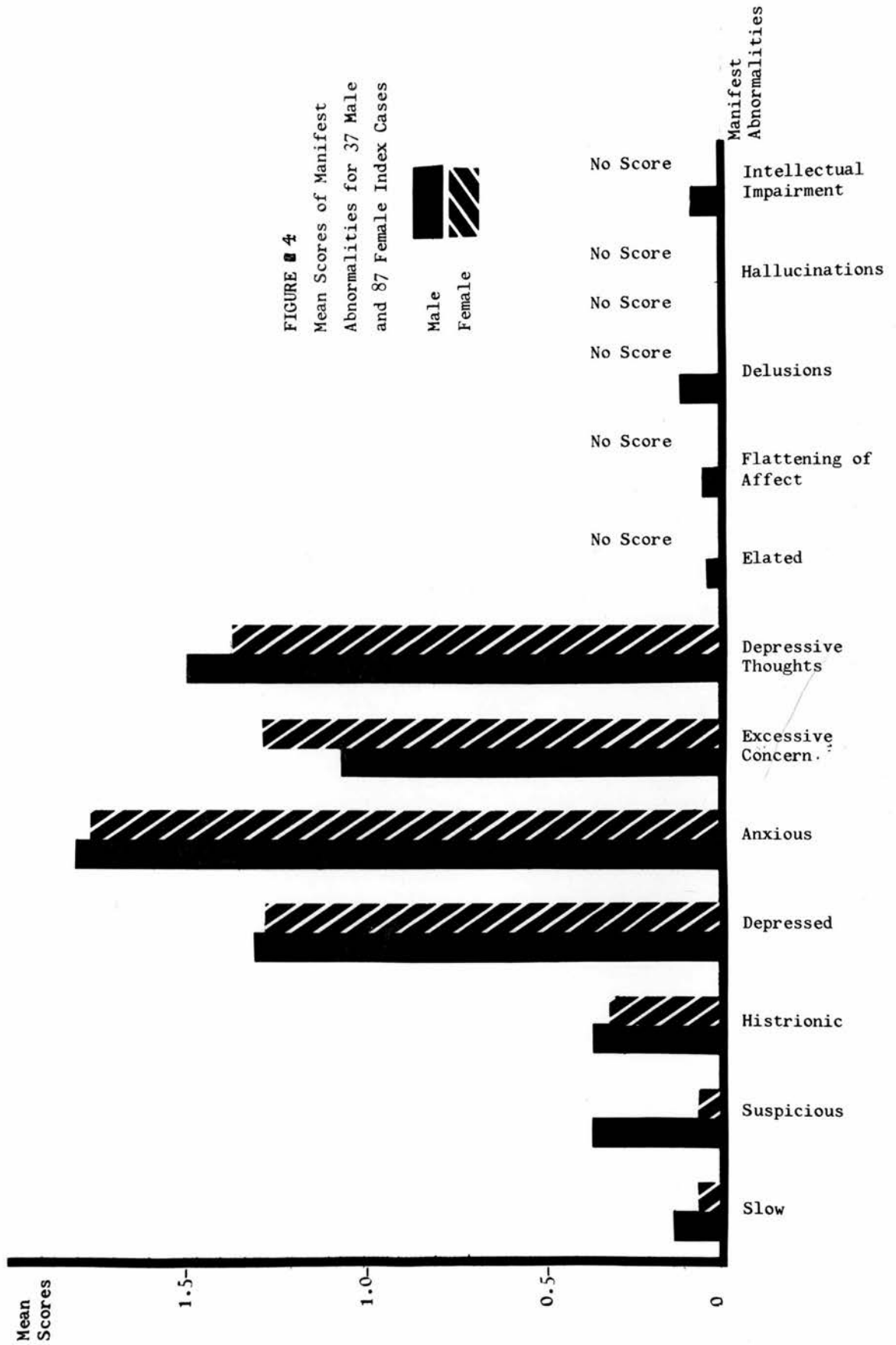


FIGURE 4
Mean Scores of Manifest
Abnormalities for 37 Male
and 87 Female Index Cases



The Physical Assessment

Following the screening two types of data were available for each patient. First, the number and nature of the manifest physical disorders from which the patients suffered were recorded. Second, each patient had a profile of results on the tests carried out during the initial screening at the Health Centre. These were the Objective Variables.

For the purposes of comparison it was necessary to quantify and classify the manifest physical disorders, since these covered a wide range of different kinds of disease process. The possible ways of doing this were by organ system, duration, severity and whether acute or chronic. Classification by organ system was found to have limited application since only cardiovascular and respiratory systems had sufficient numbers for statistical analysis. Nor was it possible to measure duration accurately or whether a condition was acute or chronic. It was accepted however, that most conditions found during the survey would be chronic since acute conditions were liable to preclude patients from attending. Although it was considered unlikely that the severity of each condition could be measured in absolute terms it seemed essential that some rank order of severity should be obtained. An operational classification into major and minor disease was therefore devised. Any condition which was regarded as being 'liable to threaten or shorten life' was placed in the major category and all others were placed in the minor category. This method of describing the disease entities was useful since it was clear that the physical disorders ought

to have different weighting. There was agreement between four physicians on which category the conditions ought to go into. It was then possible to make a comparison between the psychiatric and normal groups in regard to these diseases of differing severity. Each, potentially, had equal risk of developing these physical disorders. A similar classification was used by Buck et al (1959) but could not be adapted for this study. Each disorder was also placed into a psychosomatic category according to the classification of Sainsbury (1960). Although criteria were laid down for each condition, when diagnosed by the general practitioner, it was realised that the criteria might be differently interpreted by the individual doctors. Wherever possible the objective variables supplied corroborative evidence for each condition. The diagnoses employed for comparison were based upon those stated in the College of General Practitioners Classification of Disease (1963). In the sample studied only a proportion were actually elicited. The diagnoses that occurred are listed below according to body system.

	<u>Major Disorder</u>
<u>Cardiovascular System</u>	Ischaemic Heart Disease
	Possible Ischaemic Heart Disease
	Angina
	Hypertension
	Rheumatic Heart Disease
	Congenital Heart Disease
	Peripheral Vascular Disease
<u>Respiratory System</u>	Chronic Obstructive Bronchitis with cough and/or phlegm
	Impaired Ventilatory Capacity without symptoms
	Asthma

Other Systems

Chronic Urinary Infection
 Diverticulitis
 Hemiplegia
 Epilepsy
 Diabetes
 Thyrotoxicosis
 Myxoedema
 Present/Previous Cancer
 Rheumatoid Arthritis

Minor DisordersCirculatory System

Haemorrhoids
 Varicose Veins

Respiratory System

Chronic Sinusitis
 Chronic Otitis / Mastoiditis
 Simple Bronchitis (cough and/or phlegm)

Skin

Ichthyosis
 Seborrhoea
 Psoriasis
 Eczema

Bones and Locomotor System

Osteoarthritis
 Hallux Valgus
 Pes Cavus
 Carpal Tunnel Syndrome
 Tenosynovitis
 Congenital Dislocation of the Hip
 Prolapsed Intervertebral Disc
 Amputated Leg
 Tennis Elbow

Diseases of the Eye and Ears (excluding deafness)

Ménière's Disease
 Optic Atrophy
 Choroiditis
 Retinitis
 Glaucoma
 Squint

Digestive System

Hernia
 Peptic Ulcer
 Gingivitis
 Oesophageal Stricture

Genito-Urinary System

Cervical Polyp
 Cystocele
 Cervical Erosion
 Urethral Caruncle or Stricture
 Cervicitis
 Fibroids
 Prolapse
 Senile Vaginitis
 Vulvovaginitis
 Prostatic Hypertrophy

Blood

Iron deficiency Anaemia

Infectious Diseases

Fungal Infection

Benign Tumours

Fibroma
 Lipoma
 Cyst
 Ganglion
 Non-toxic Goitre

Using the classification devised by Sainsbury (1960) any condition which fell into the following list was described as psychosomatic.

Asthma	Alopecia
Coronary Disease	Dermatitis
Diabetes	Eczema
Hypertension	Fungal Infections with hyperhidrosis
Peptic Ulcer	Pruritis
Pulmonary Tuberculosis	Psoriasis
Rheumatoid Arthritis	Seborrhoeic Dermatitis
Thyrotoxicosis	Urticaria
Chronic Nasal Infection	Cervical Erosion
Irregular Menstruation	Herniated Disc
Leucorrhoea	Obesity
Menorrhagia	

Total Physical Diagnoses

When all the diagnoses had been collected and sorted into the categories, previously stated, it was then possible to make direct comparisons between the Index and Control groups and sub-groups within these groups. The men and women were analysed separately since it was expected that their disease patterns might differ. The sexes were then sub-divided into those between the ages of 40-52 and 53-64, since it was anticipated that an older group might differ in degree or kind from the younger group in respect of physical morbidity.

The distribution of the physical diseases among the Index and Control groups and their sub-groups is shown in Table 11 (see page 148).

The discrepancy between the number of conditions and the number of patients is due to the fact that some of the patients suffered from more than one condition. Although Table 11 shows that the Index group had a preponderance of physical illness this is clearly an oversimplification, since it is based upon the assumption that each condition had equal weighting and that the different age-groups within the Index and Control groups had an equal opportunity to develop a physical illness. It was therefore, considered necessary to do more detailed analyses.

Psychosomatic Disease

Any physical condition which was included in the list compiled by Sainsbury was called 'Psychosomatic'. The distribution of these among the Index and Control groups, and sub-groups, is shown in Table 12 (see page 149).

Table 11 The Number and Nature of the Physical Conditions in the Index and Control Groups by Sex and Age

The Physical Conditions	Males				Females			
	40-52 yrs		53-64 yrs		40-52 yrs		53-64 yrs	
	Index	Control	Index	Control	Index	Control	Index	Control
Major								
Circulatory System	8	4	7	1	16	7	14	9
Respiratory System	6	4	5	3	19	21	20	15
Urinary System	0	0	0	0	2	0	2	0
Digestive System	0	0	0	0	0	0	1	0
Central Nervous System	1	0	0	0	1	0	1	1
Endocrine System	1	0	0	0	1	1	2	0
Cancer	0	0	0	0	1	1	1	1
Locomotor System	0	0	0	0	2	1	2	0
TOTAL	16	8	12	4	42	31	43	26
Minor								
Circulatory System	7	2	5	2	10	8	5	5
Respiratory System	8	4	1	2	7	1	2	3
Skin	2	0	0	1	1	0	1	4
Bones and Locomotor System	1	0	4	2	6	7	2	5
Dis. of Eyes and Ears (excl. deafness)	1	0	0	1	2	4	2	1
Alimentary System	4	4	0	2	2	4	0	3
Genito-Urinary System	0	0	2	0	9	14	6	1
Iron-deficiency anaemia	1	0	0	0	5	8	1	4
Infectious Disease	0	0	0	0	0	0	0	1
Benign tumours	2	1	3	2	4	1	1	3
TOTAL	26	11	15	12	46	47	20	30
Total Patients	25	25	12	12	57	57	30	30

Table 12 The Distribution of Psychosomatic Disease among the Index and Control Groups by Age and Sex

The Psycho-somatic Conditions	Males				Females			
	40-52 yrs		53-64 yrs		40-52 yrs		53-64 yrs	
	Index	Control	Index	Control	Index	Control	Index	Control
Major								
Coronary Heart Disease	8	3	3	1	12	5	8	5
Hypertension	0	1	3	0	4	1	5	4
Asthma	0	0	0	0	0	0	1	0
Diabetes	1	0	0	0	0	1	0	0
Thyrotoxicosis	0	0	0	0	1	0	1	0
Rheumatoid Arthritis	0	0	0	0	2	1	2	0
TOTAL	9	4	6	1	19	8	17	9
Minor								
Chronic nasal Infection	1	0	0	0	0	0	0	0
Seborrhoeic Dermatitis	1	0	0	0	0	0	0	0
Psoriasis	0	0	0	1	1	0	0	2
Eczema	0	0	0	0	0	0	1	2
Prolapsed Inter-vertebral Disc	0	0	0	0	1	1	0	0
Peptic Ulcer	1	0	0	2	1	2	0	0
Cervical Erosion	0	0	0	0	3	6	1	0
Menorrhagia/Irregular Menstruation	0	0	0	0	12	18	1	1
Fungal Infection	0	0	0	0	0	0	0	1
TOTAL	3	0	0	3	18	27	3	6
Total Patients	25	25	12	12	57	57	30	30

Only two-thirds of the conditions in Sainsbury's list are included in Table 12, since the others did not occur in the sample examined. Obesity was deliberately excluded because of problems of definition and will be discussed later.

In order to examine whether a true difference in the amount of physical disease existed between the Index and Control groups, it was necessary to determine the distribution of physical illness among the individuals in these groups. Otherwise a few patients with a great deal of physical illness might have produced a spurious result. The data was therefore analysed, to find the amount of physical illness suffered by individuals in the various sex and age groups.

MALE PATIENTS

Major Disease

The distribution of major physical disease was different between the Index and Control patients. The Index group contained fewer people free from physical morbidity and more with two or a greater number of conditions. The differences are shown in Table 13.

Table 13 The Distribution of Major Physical Disease by Individual in the Male Index and Control Groups by Age

Physical Conditions by Individual	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Total Index	Total Control
0	56.0	68.0	41.67	66.67	51.4	66.7
1	28.0	32.0	25.0	33.33	27.0	33.3
2	12.0	-	25.0	-	16.2	-
3	4.0	-	8.33	-	5.4	-
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total	25	25	12	12	37	37

There was a tendency for the number of major physical illnesses per individual to increase with age. This finding was independent of whether the patient was psychiatrically ill or not. Despite this trend the excess of physical illness in the Index patients was maintained in both the younger and older age-groups. The difference in the average number of major diseases between the male Index and Control groups was significant (t test = 2.5662; $p < 0.02$). The difference was significant for the older group (t test = 2.114; $p < 0.05$) but although the younger group showed the same trend ($p < 0.2$) this was not significant.

In the same way the number of major psychosomatic conditions was examined. The distribution is shown in Table 14.

Table 14 The Distribution of Major Psychosomatic Disease by Individual in the Male Index and Control Groups by Age

Psychosomatic Conditions by Individual	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
	%	%	%	%	%	%
0	68.0	84.0	58.3	91.6	64.9	86.5
1	32.0	16.0	41.7	8.4	35.1	13.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	25	25	12	12	37	37

The difference in the average number of major psychosomatic conditions between the Male Index and Control groups was significant ($\chi^2 = 4.6982$; 1 d.f., $p < 0.05$). The major psychosomatic category was almost entirely made up of cardiovascular disease.

Minor Psychosomatic Conditions

There were only 6 minor psychosomatic conditions, divided equally between the young Index and old Control groups. No significant differences were found.

Minor Disease

The trend for the Index group to suffer from more physical disease than the Control group held for minor illness. The distribution of the minor physical illnesses among the various groups is shown in Table 15.

Table 15 The Distribution of Minor Physical Disease by Individual in the Male Index and Control Groups by Age

Physical Conditions by Individual	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
	%	%	%	%	%	%
0	32.0	60.0	16.6	41.6	27.0	54.1
1	32.0	36.0	50.0	25.0	37.9	32.4
2	36.0	4.0	25.0	25.0	32.4	10.8
3	-	-	8.4	8.4	2.7	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total patients	25	25	12	12	37	37

The difference in the average number of minor physical conditions between the Index and Control groups was significant (t test = 2.930; $p < 0.02$). When the younger and older groups were analysed separately it was found that the significant difference held for the younger group (t test = 3.021; $p < 0.005$) but not for the older group. This discrepancy may have been related to the small numbers in the older group.

The Predominant Conditions

The conditions which largely produced the excess of both major and minor physical illness in the Index group belonged to the circulatory and respiratory systems. These two systems will be dealt with separately.

Cardiovascular Disease

Major

The diagnoses in this system were corroborated wherever possible using objective measurements. Ischaemic heart disease was confirmed by electrocardiographic evidence and hypertension by serial measures of the blood pressure. Only angina and peripheral vascular disease were left to the discretion of the general practitioner and here strict criteria were laid down for diagnostic purposes. The distribution of major diseases of the cardiovascular system is shown in Table 16.

Table 16 The Distribution of Major Cardiovascular Diseases in the Male Index and Control Groups by Age

Major Cardio-vascular Disease	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
0	68	84	50	91.7	62.0	86.5
Ischaemic Heart Disease (IHD)	12	4	-	-	8.1	2.7
Possible IHD	20	8	8.33	8.3	16.3	8.1
Angina	-	-	8.33	-	2.7	-
Hypertension	-	4	16.68	-	5.5	2.7
Hypertension and IHD	-	-	8.33	-	2.7	-
Peripheral Vascular Disease	-	-	8.33	-	2.7	-
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	25	25	12	12	37	37

It is clear from Table 16 that not only were there fewer people free from cardiovascular disease in the Index group but that there was an excess in all disease categories. The difference between Index and Control was significant for the types of cardiovascular disease collectively ($\text{Chi}^2 = 5.7358$; 1 d.f.; $p < 0.025$). Similarly the difference between the two groups for coronary heart disease was significant ($\text{Chi}^2 = 4.1042$; 1 d.f.; $p < 0.05$).

Since all the diagnoses of coronary heart disease were made according to E.C.G. criteria it must be certain that the instrument has a satisfactory validity and reliability. Wilson (1968) has pointed out that the E.C.G. although highly significant when positive is not a certain diagnostic instrument when used by itself. The false positive rate is not yet clear since post-mortem evidence is lacking. The prospective studies, such as the Framingham, have shown that there are certainly false negative readings. A recent study of the prevalence of ischaemic heart disease carried out by W.H.O (1967) clarified the difficulties of such work. Six European countries were surveyed and despite the centralisation of the coding system, problems were encountered with the validity of the E.C.G. It was stated that "In the general population, E.C.G. changes so gross as to be certain indications are rarely seen and in epidemiological surveys other changes which are less certain but somewhat more frequent must therefore be used as indices of infarction". The Minnesota Coding devised by Blackburn et al (1960) was accepted and implemented by the W.H.O. survey.

The final results were as follows:-

<u>Diagnosis</u>	<u>Minnesota Coding</u>	<u>E.C.G. items</u>	<u>Prevalence Range</u>
Certain Ischaemia	1:1	Q/QS items	Small number
Probable "	1:1-2 or 7:1	Q/QS items Left bundle branch block	1.4-2.6%
Possible "	1:3 4:1-3 5:1-3	Q/QS items S-T items T wave items	8.8-12.2%

For the purposes of this study, certain modifications were made with ischaemic heart disease being 1:1, 1:2, 7:1 and possible ischaemic heart disease being 1:3, 4:1-3, 5:1-3. Comparison between this study and other surveys is difficult because of the differences in sample size and the types of prevalence. Most other surveys have examined incidence or period prevalence whereas this one looked at point prevalence.

The point prevalence for the 74 Index and Control cases was:-

Ischaemic heart disease	5.4% (8.1% Index; 2.7% Control)
Possible I.H.D.	13.5% (18.9% Index; 8.1% Control)
Angina	2.7% (Index cases only)
Total	21.6%

A broad comparison can be made with the results of a study by Rose (1962). Using all the above E.C.G. items he found an overall prevalence of 20% in nearly 2000 English working men.

The 15 Index and Control patients with ischaemic heart disease differed in some respects from the rest of the sample studied. They smoked on average 20 grams of tobacco daily

compared with 15 grams for the rest of the male sample. Although 3 of the 14 cases had indices of obesity outside one standard deviation from the mean for the total sample the average obesity index did not differ from that for the total. Similarly the blood uric acid and cholesterol levels did not differ. The mean systolic and diastolic blood pressures were raised compared with the total sample, although not to a significant degree. However, on all measures of psychiatric severity the patients with ischaemic heart disease had higher mean scores than those for the rest of the sample. These differences are shown in Table 17.

Table 17 The Measures of Psychiatric Severity in the Male Patients with Ischaemic Heart Disease Compared with the Rest of the Male Index Sample

	Overall Severity Score		C.M.I Score		Observer Score	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Patients with I.H.D. (11)	27.4	9.9	10.5	4.8	2.54	0.50
Patients in Rest of Sample (26)	23.1	7.2	8.4	4.0	2.15	0.41

Thus there was a non-significant trend for greater psychiatric severity among the patients with ischaemic heart disease.

In terms of demographic characteristics, those with ischaemic heart disease showed no distinct differences from the rest of the sample. The mean age was 49.7 years. They were all married. There were slight social class differences, but with no trend shown.

The three cases of hypertension alone, two Index and one Control, had no special characteristics. They were all smokers and their objective variables, other than blood pressure, lay within the normal range.

Minor Circulatory Disease

The two conditions which made up this group were haemorrhoids and varicose veins. There were 6 cases of haemorrhoids in the Index group as compared with one in the Control group; the figures for varicose veins were 6 and 3, respectively. These conditions had to be interpreted by the general practitioner from the symptoms stated in the questionnaire and general examination. Since criteria were laid down for diagnosis the possible risk that the psychiatric patients might answer positively to more items on the questionnaire should have been minimal. Although the actual number of conditions was small, when analysed together for the Index and Control groups as a whole a significant difference was found ($\chi^2 = 5.103$; 1 d.f.; $p < 0.025$). The distribution of the conditions between the two groups is shown in Table 18.

Table 18 The Distribution of the Minor Circulatory Disorders between the Male Index and Control Groups

Minor Circulatory Disorders by Individual	Index %	Control %
0	66.7	89
1	33.3	11
Total	100.0	100.0
Total Conditions	12	4

Respiratory Disease

The screening for diseases of the lung was carried out using a questionnaire, chest X-ray and measurements of lung function. It was directed towards the commonest forms of lung pathology, chronic bronchitis, asthma and emphysema, although it was possible to diagnose bronchial carcinoma and pulmonary tuberculosis by these methods.

The symptoms of chronic bronchitis and related disorders can vary greatly in severity and range from occasional expectoration to a productive cough and incapacitating breathlessness. For the purposes of survey work, attempts have been made to standardise questionnaires and produce acceptable gradings of severity. The subject has been reviewed by the Medical Research Council (1965-1966), and Cochrane and Fletcher (1968).

The Medical Research Council's Committee on Research into Chronic Bronchitis examined the previous epidemiological, clinical and pathological work and in an effort to clarify the confusion of terminology approved of three manifestations of chronic bronchitis.

First, Simple Bronchitis characterised by mucoid expectoration. It is usually discounted as smokers' cough by the patient. The diagnosis is made by questioning about regular expectoration using the M.R.C. standardised questionnaire on respiratory symptoms. The symptoms of cough and phlegm must have persisted for 3 months in order to satisfy the criteria for chronic bronchitis.

Second, Mucopurulent Chronic Bronchitis, in which the sputum is intermittently or continually mucopurulent owing to active bronchial infection.

Third, Obstructive Chronic Bronchitis, where in addition to expectoration there is narrowing of the airways causing increased resistance to airflow. It is this form which eventually causes breathlessness and may result in death from respiratory or cardiac failure.

Airway obstruction can be assessed by means of a spirometer, which measures forced expiratory volume in one second (FEV 1.0) and the total expired volume or vital capacity (FVC) ; or alternatively using the Wright Peak Flow Meter which measures the degree of impairment of ventilatory capacity. A standard procedure for the use of these instruments in surveys was recommended by the Medical Research Council.

It was suggested that there should be a simple grading based upon the responses to the standardised questionnaire and the results of the tests of ventilatory capacity. The Committee considered that this might help in comparisons of the frequency and severity of chronic bronchitis in different population groups. In regard to combinations of symptoms the Committee considered that it did not yet seem possible to agree upon which proposed groups of symptoms indicated 'Chronic Bronchitis'.

At the health screening survey each patient answered questions related to breathlessness, cough, phlegm and shortness of breath with wheezing. These items were extracted from the M.R.C. questionnaire on respiratory symptoms. Further, the

Peak Expiratory Flow Rate (P.E.F.R.), the One-second Forced Expiratory Volume (F.E.V. 1.0) and the Forced Vital Capacity (F.V.C.) were estimated. The M.R.C. classification was used but had to be modified because of lack of data and the nature of the results. No information was available on chest illnesses so the category of mucopurulent chronic bronchitis could not be included.

Simple Bronchitis was diagnosed when the patient admitted to regular expectoration and cough for at least three months. This category was defined as minor since it did not clearly threaten or shorten life.

Obstructive Chronic Bronchitis was defined as expectoration for at least three months with evidence of airway obstruction.

A further group which emerged was one where, although the patient had evidence of impaired ventilatory capacity, there were no complaints of cough and phlegm or the symptoms were present for an inadequate length of time. Both these last two categories were described as major since the results were presumptive of major lung changes. The results of the classification when applied to Index and Control group are shown in Table 19.

Table 19 The Distribution of the Types of Respiratory Disease among the Male Index and Control Groups

The Types of Respiratory Disease	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
Normal Lung Function	60.0	68.0	58.3	58.3	59.4	64.8
Simple Chronic Bronchitis	20.0	16.0	-	16.7	13.5	16.2
Obstructive Chronic Bronchitis	12.0	-	33.3	16.7	19.0	5.4
Impaired Ventilatory Capacity without symptoms	8.0	16.0	8.4	8.3	8.1	13.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	25	25	12	12	37	37

The differences between Index and Control groups were not consistent. Thus although the Index group contained 7 out of the 9 males with obstructive chronic bronchitis and fewer people with normal lung function, the Controls had an excess of those with simple chronic bronchitis and more of the group with evidence of impaired ventilatory capacity, but no complaint of cough and phlegm for three months.

While the above classification is useful for epidemiological purposes and broadly describes normal and abnormal lung function, by employing arbitrary thresholds it does not make sufficient allowance for such factors as age, height, vital capacity, smoking habits and the false-positive and negative rates. Cotes (1968), has suggested that for most indices of ventilatory capacity the age, sex and the standing height of

the subject are the most useful reference points. Within one ethnic group they account for approximately 60% of the total variability about the regression lines. When the height and age of a subject are used to estimate a value the regression relationship may be said to describe normal values. Sufficient data are available to provide predictive scores and standard deviations for males and females of European origin.

Predictions are best for groups rather than individuals at present, since because of the bias produced by averaging it is almost impossible for a subject to have average values on all indices at one time. Cotes recommends that absolute values should be reported and that wherever possible the results should be confirmed by other means. Comparison of several indices is the most useful approach since minimal weight can be given to a value where only 60% of the variability can be accounted for by the parameters of age and height.

The relationship between the observed and expected scores in the patients, described in Table 19, are shown in Appendix 6. Each line gives the scores for patients classified as abnormal by the M.R.C. criteria.

Most of the patients with obstructive chronic bronchitis and with impaired ventilatory capacity without symptoms had a value more than 2 standard deviations outside their predicted score. This can only occur by chance on one occasion in twenty. Only two of these cases did not have a value outside two standard deviations (although they did have values between one and two S.D.) out of a total of seventeen cases. Second, only

two of the ten cases with simple chronic bronchitis had a value outside 2 standard deviations. This would suggest that classification into a gradient of severity has some justification.

The ventilatory capacity varies directly with the size of the lung (and, therefore, the vital capacity) and as a function of the airway resistance is affected by loss of lung tissue, increased tone of the bronchial muscles and hypertrophy, oedema or hyperaemia of the bronchial mucosa. As a fundamental measure the ventilatory capacity is useful in surveys since any reduction due to airway narrowing is detectable long before it is severe enough to cause disability. However, although reduction in ventilatory capacity in community surveys is most commonly likely to be due to airway resistance (as in chronic bronchitis and emphysema) it may also be due to a decrease in the vital capacity. The relative contributions of these two factors can be discovered from the ratio of the forced expiratory volume over the forced vital capacity, expressed as a percentage. Thus, when an individual has a reduction in ventilatory capacity (or ventilatory defect) it can be either obstructive or non-obstructive. In the obstructive type the ratio described above (FEV%) is low because of disproportionate reduction in the FEV 1.0 due to widespread narrowing of the lung airways. It is prominent in asthma, chronic bronchitis and emphysema. The non-obstructive type usually follows a reduction in the vital capacity and, therefore, the ratio is high. Diseases of the lung parenchyma such as sarcoidosis and interstitial fibrosis, and conditions affecting the movement of the

chest wall as with obesity or ankylosing spondylitis, will produce this type of ventilatory defect.

Obstructive Chronic Bronchitis

The 9 male patients with obstructive chronic bronchitis were older than the mean for the total male sample. The mean age was 56.4 years. They had all smoked cigarettes, although two had stopped, for most of their adult lives. Three of the 9 cases had an F.E.V.% more than two standard deviations outside the predicted value, suggesting an obstructive type of ventilatory defect, whereas the others had F.E.V.% in the normal range possibly indicating a non-obstructive type of lesion. However, these were not distinct entities since all the values were variously reduced in these cases and the F.E.V.% is a relative value. Only one case had an X-ray abnormality, showing an old tuberculous lesion. All except one case complained of breathlessness on exertion and only two did not complain of wheeziness. Their mean index of obesity was less than the mean for the total sample.

Simple Chronic Bronchitis

In contrast the 11 men with simple chronic bronchitis were younger, on average, with a mean age of 47.9 years. Again, they had all smoked cigarettes during their lives, with one having stopped. Two had abnormal chest X-rays, with one patient having old tuberculous pleural thickening and another having bronchiectasis. Although this is potentially a major condition in this instance it was only in a mild form and, therefore, included for convenience with the simple bronchitis group.

All except one complained of breathlessness on exertion whereas only two said that they suffered from wheeziness. It is possible that, being a younger group on average, those with simple chronic bronchitis were in an early phase of a disease process which might ultimately lead to the condition of obstructive chronic bronchitis. Since the sample was small the excess of simple bronchitis in the Control group was not significant.

Impaired Ventilatory Capacity without Symptoms

The 8 cases, so presenting, were divided slightly unequally with three in the Index group and five in the Control. Two cases had a low F.E.V.% but they only complained of breathlessness. Two other patients had more complicated clinical pictures. Thus, one man had diabetes, ischaemic heart disease, and had had a lobectomy for tuberculosis. There was no electrocardiographic evidence of cor pulmonale and the lung function tests suggested a non-obstructive lesion, although he did complain of wheeze, probably due to loss of lung tissue. Another individual had hypertension and E.C.G. evidence of both right and left ischaemic heart changes. He complained only of breathlessness and had a non-obstructive type ventilatory defect. The other five patients complained only of breathlessness and showed both obstructive and non-obstructive defects. It is most unlikely that these results were artefacts since they all had at least one value more than two standard deviations away from the predicted score. They were, however, a heavier group of patients on average with a higher mean score

on the index of obesity than that for the total sample.

The figures in Appendix 6 show that, in terms of ventilatory capacity, the patients with obstructive chronic bronchitis and impaired ventilatory capacity were very similar. Summating the two presentations of lung function showed that 27% of the Index group were so afflicted compared with 19% of the Controls. This difference was not significant. However, this comparison only includes those patients with objective evidence of lung function impairment. The inclusion of all members of the Index and Control samples permits any group differences to be demonstrated. The means and standard deviations of the measures of ventilatory capacity are shown in Table 20.

Table 20 Comparison of the Measures of Ventilatory Capacity for the Index and Control Groups

Measures of Ventilatory Capacity	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
P.E.F.R.	483.5	483.3	411.9	450.0	445.4	472.5
Standard Deviation	92.5	87.6	127.9	114.4	106.1	96.8
F.E.V. 1.0	348.6	317.0	260.0	288.5	319.9	307.8
Standard Deviation	149.0	63.7	66.2	85.4	133.9	71.5
F.V.C.	405.7	414.0	352.3	368.6	387.9	399.2
Standard Deviation	82.3	55.4	62.4	90.3	80.3	74.2

The table shows that there was a non-significant trend on some of the indices of ventilatory capacity, all for the older age-group, for the Index group to have lower mean values than the Control group. Both groups showed the decline with age in

ventilatory capacity which is consistently found in this field.

Respiratory Symptoms

The application of the M.R.C. classification showed that although there were persons in the Index and Control groups with very similar degrees of respiratory impairment, the Index cases tended to complain more. Further evidence of this greater tendency to complain can be found in two ways. First, by comparing the proportions in the Index and Control groups who had no respiratory symptoms. These are shown in Table 21.

Table 21 The Proportion of Patients in the Male Index and Control Groups with and without Respiratory Symptoms

Respiratory Symptoms	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
No symptoms	20.0	52.0	33.3	58.3	24.3	54.0
With symptoms	80.0	48.0	66.7	41.7	75.7	46.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total patients	25	25	12	12	37	37

There was a significant difference between the number of people with respiratory symptoms in the Index group, as a whole, compared with the Control group ($\chi^2 = 6.860$; 1.d.f.; $p < 0.01$). The excess in the Index group was found in all the respiratory symptoms, which were breathlessness on exertion, cough, phlegm, and shortness of breath.

A second method of comparison used was comparing the presence of symptoms in those who had 'normal' lung function by the M.R.C. criteria. Screening a random sample of the population produces a spectrum of disease, from the mildest through to

the more severe forms and any arbitrary threshold only separates the more severe from the so-called 'normals'. However, it was clear that the 'normals' too had symptoms, although these fell short of the threshold for classification as a case. The distribution of symptoms among the 'normals' is shown in Table 22.

Table 22 The Distribution of the Respiratory Symptoms among the Normal Males in the Index and Control groups

Respiratory Symptoms	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
Breathlessness on Exertion	46.6	23.5	42.9	-	45.5	16.7
Cough for less than 3 months	26.6	29.4	14.3	-	22.7	20.8
Phlegm for less than 3 months	26.6	17.6	28.6	-	27.3	12.5
Shortness of breath with wheeze	13.3	-	14.3	-	13.6	-
Total patients with normal lung function	15	17	7	7	22	24

The figures in this Table do not add up to 100% because some patients had more than one symptom and others none at all. The purpose of this table is to compare the relative proportions within the group with symptoms. The age-groups within the Index group resemble each other on all items except cough. In contrast the Control groups complained less on all items except cough in the 40-52 age-group. Indeed the older Control group did not complain at all. The difference between the number of people complaining of breathlessness on exertion in the Index group

compared with the Control group was significant ($\chi^2 = 4.9078$; 1 d.f.; $p < 0.05$).

The discrepancies between the Index and Control groups were not due to differences in smoking habits. The two groups were practically identical in their present and past smoking behaviour. Ten per cent of each group had never smoked, whereas two thirds had smoked for more than 25 years. Those who currently smoked consumed on average 16 grams of tobacco daily.

It would appear therefore, that although the Index cases as a group gave significantly more positive responses to the respiratory questionnaire than the Control group, the lung function tests did not confirm that they had significantly more lung dysfunction.

Seven of the Index cases had ischaemic heart disease and obstructive chronic bronchitis or impaired ventilatory capacity without symptoms.

Minor Respiratory Disease

This heading included simple chronic bronchitis, chronic sinusitis, otitis and mastoiditis. There was a slight excess, but not significant among the Index group.

Other Minor Conditions

The remaining minor conditions were sparsely distributed among the male sample except for deafness. Diseases of the skin, bone and locomotor system, genito-urinary system and benign tumours, although meagre in number, were all in excess in the Index group. A high proportion of both Index and Control groups suffered from some form of deafness as measured by the

audiogram. This occurred in 54% of the Index cases and 46% of the Controls. It was mostly high-tone deafness and the patients were usually not aware of the condition. The difference was not significant.

The Objective Variables

The objective variables were the indices of health measured at the screening survey in the Health Centre. The means and standard deviations were estimated for each value and compared between the Index and Control group. Any differences were small and non-significant. The Index group had a slight tendency to have a lower score on the indices of obesity, Quetelet's Index ($\frac{\text{Weight}}{\text{Height Squared}} \%$) * and skinfold thickness, to be more anaemic and to have higher mean scores on the blood pressure readings. The blood pressure values are shown in Table 23.

Table 23 The Mean Blood Pressures for the Index and Control Groups by Age

Blood Pressure in mmHg	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
Systolic	127.5	128.2	152.2	141.2	135.5	132.8
Standard Deviation	14.2	13.3	23.2	24.2	18.2	18.2
Diastolic	75.1	77.3	87.1	74.8	78.9	76.5
Standard Deviation	9.4	10.5	12.3	11.5	11.7	10.8
Pulse	52.4	51.4	65.1	66.3	56.5	56.3
Standard Deviation	11.8	8.3	16.8	18.4	14.6	14.1

As expected, within the Index and Control groups, the blood pressure rose with age. However, the rise was appreciably greater in the Index group, but not to a significant degree. This difference applied to both systolic and diastolic pressures

* See Appendix 3.

but not to pulse pressure.

Female Patients

Major Disease

The differences exhibited between Index and Control males, in respect of major disease, held for the females. The distribution between the Index and Control groups is shown in Table 24.

Table 24 The Distribution of Physical Disease by Individual in the Female Index and Control Groups by Age

Physical Conditions by Individuals	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
0	43.8	57.9	20.0	36.6	35.6	50.6
1	40.4	31.5	26.7	43.4	35.6	35.6
2	14.0	8.8	43.3	16.7	24.1	11.5
3	1.8	1.8	6.7	3.3	3.5	2.3
4	0.0	0.0	3.3	0.0	1.2	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

As with the men, there was a tendency for the average number of illnesses to increase with age, both in the Index and Control groups. The difference in the average number of major physical disorders between the two groups was significant (t test = 2.7853; $p < 0.01$). The difference was significant for the 40-52 age-group (t test = 2.010; $p < 0.05$) and highly significant for the 53-64 age-group (t test = 3.6066; $p < 0.001$).

Major Psychosomatic Disease

The distribution of major psychosomatic disease among the Index and Control groups is shown in Table 25.

Table 25 The Distribution of Major Psychosomatic Disease among the Female Index and Control Groups by Age

Major Psychosomatic Disease	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
0	66.7	87.7	56.7	76.7	63.2	84.0
1	33.3	10.5	33.3	16.6	33.3	12.5
2	-	1.8	10.0	6.7	3.5	3.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

The difference in the average number of major psychosomatic illnesses between the Index and Control groups was significant (t test = 2.828; $p < 0.01$). Whereas with the men the difference was largely made up of ischaemic heart disease, in the women the conditions were more broadly spread. Thus while having an excess of coronary heart disease, this group also contained an excess of hypertension and rheumatoid arthritis and the only cases of asthma and thyrotoxicosis.

Minor Psychosomatic Disorders

There was a trend for the female Control patients to have more minor psychosomatic disorders than the Index cases, although not to a significant degree. This difference was largely due to an excess of gynaecological and menstrual disorders among the Controls.

Minor Disease

The distribution of minor disease among the Index and Control groups is shown in Table 26.

Table 26 The Distribution of Minor Physical Disease by Individual in the Female Index and Control Groups by Age

Physical Conditions by Individual	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
0	40.3	49.0	43.3	40.0	41.4	46.0
1	45.6	33.3	46.7	26.7	46.0	31.0
2	10.5	8.8	10.0	30.0	10.4	16.1
3	1.8	3.5	-	-	1.1	2.3
4	1.8	5.4	-	3.3	1.1	4.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

The difference between the average number of minor physical conditions in the Index and Control groups was not significant. Although the Index cases had less individuals free from a minor physical illness and more with one illness than the Controls these differences did not hold with multiple minor conditions. It is not clear why the women did not follow the same pattern as the men. Certainly such conditions as anaemia and hernia were in excess in the Control group.

The Predominant Conditions

As with the male sample the diseases which predominated were of the cardiovascular and respiratory systems. These will be dealt with separately.

Cardiovascular Disease

The distribution of cardiovascular disease among the female Index and Control groups is shown in Table 27.

Table 27 The Distribution of Major Cardiovascular Disease among the Female Index and Control Groups by Age

Major Cardiovascular Disease	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
0	72.0	87.75	63.3	76.6	69.0	84.0
Ischaemic Heart Disease (I.H.D.)	1.7	-	-	-	1.1	-
Possible I.H.D.	15.8	8.75	16.7	10.0	16.1	9.2
Angina	3.5	-	-	-	2.3	-
Hypertension	7.0	1.75	6.7	6.7	6.9	3.5
Hypertension and I.H.D.	-	-	10.0	6.7	3.5	2.2
Congenital Heart Disease	-	-	3.3	-	1.1	-
Rheumatic Heart Disease	-	1.75	-	-	-	1.1
Total	100.0	100.00	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

It is clear that the Index group not only had fewer people free from cardiovascular disease but had excess numbers in every disease category except rheumatic heart disease. The difference for cardiovascular disease was significant ($\chi^2 = 5.3926$; 1 d.f.; $p < 0.025$), and for coronary heart disease ($\chi^2 = 4.0277$; 1 d.f.; $p < 0.05$). The point prevalence for the 174 female patients examined was 0.6% Ischaemic Heart Disease (only Index cases), 15.5% Possible Ischaemic Heart Disease (19.5% Index; 11.5% Control) and 1.15% Angina (only Index cases).

The females with coronary heart disease had average values, on some of the objective variables, greater than those for the rest of the sample. These differences are shown in Table 28.

Table 28 The Differences on the Objective Variables Between the Patients with Coronary Heart Disease and the Rest of the Sample

	Index		Control	
	Coronary Patients (20)	Rest of Sample (67)	Coronary Patients (10)	Rest of Sample (77)
Mean Quetelet's Index	381.8	364.1	390.0	365.1
S.D.	60.9	83.7	88.9	59.3
Mean Systolic Blood Pressure	145.3	137.9	152.5	133.6
S.D.	34.25	26.15	29.5	21.0
Mean Diastolic Blood Pressure	85.6	78.3	85.7	76.8
S.D.	17.5	15.5	18.8	13.0
Mean Serum Cholesterol	268.2	225.6	275.8	240.8
S.D.	60.0	62.0	35.5	43.0
Mean Blood Urea	32.3	28.8	30.9	29.4
S.D.	10.6	8.3	7.3	8.1
Mean Serum Uric Acid	5.65	5.32	5.86	5.57
S.D.	1.65	1.46	1.0	1.15

Although no significant differences were shown between the coronary patients and the rest of the sample on these variables, Table 28 shows that both the Index and Control patients with coronary heart disease had higher scores on the variables commonly found to be associated. Thus, although there were more patients with this disorder among the psychiatric sample, the blood chemistry, amount of obesity and blood pressure readings were very similar for coronary cases in both samples.

In respect of smoking no differences were found between any of the groups. It was found however, that there was a non-significant trend for more of the coronary cases to have undergone the menopause.

In contrast with the men there was only a slight tendency for the coronary cases to have higher scores on the psychiatric measures. Thus, the mean score for the coronary cases on Overall Severity was 26 (S.D. 7.6) compared with 23.7 (S.D. 8.0) for the rest; 2.4 (S.D. 0.49) compared with 2.25 (S.D. 0.49) for Observer Severity; and 9.15 (S.D. 2.9) compared with 9.6 (S.D. 3.4) for C.M.I. The differences were not significant.

Some differences were found with demographic features. Social classes I and II were under-represented and class III (manual) was over-represented. All the patients were married except for one widow. Fewer of the coronary cases were engaged in full-time employment (20%) than was average for the rest of the sample (31.3%) and more were full-time housewives (36.7%) compared with the rest of the sample (25.7%), but not significantly. The same proportion was in part-time employment. It should be noted that the Index and Control groups had very similar employment patterns.

The number of cases of hypertension (9 Index and 5 Control) was small for comparative purposes, but collectively they had a high mean index of obesity (400) and mean blood urea level (34 mg.%) compared with the rest of the sample.

Major Respiratory Disease

The M.R.C. classification was applied to the women and the distribution of major respiratory disease among the female Index and Control cases is shown in Table 29.

Table 29 The Distribution of Respiratory Disease among the Female Index and Control Groups by Age

Types of Respiratory Disease	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
Normal Lung Function	59.7	61.4	30.0	43.3	49.5	55.2
Simple Chronic Bronchitis	7.0	1.8	3.3	6.7	5.8	3.4
Obstructive Chronic Bronchitis	14.0	3.5	10.0	-	12.6	2.3
Impaired ventilatory Capacity Alone	19.3	33.3	53.4	50.0	31.0	39.1
Asthma	-	-	3.3	-	1.1	-
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

Fewer women in the Index group were free from lung pathology and more Index cases had obstructive chronic bronchitis. As with the men however, there were more cases with impaired ventilatory capacity, but without symptoms, in the Control group than in the Index group. This especially applied to the younger age-group. When the forms of major respiratory disease were summated, the Index group had only a slightly higher proportion (44.7%) than the Control group (41.4%). The M.R.C. classification did not show any significant differences between Index and Control group overall.

The application of the observed and expected scores,

according to the method described by Cotes, in the patients described in Table 29 are shown in Appendix 6. As with the men the M.R.C. classification was broadly justified by the deviations from normal of the predicted values. Some patients had values lying within one standard deviation of the expected value, but it should be noted that Cotes had pointed out that errors in prediction are likeliest to be greatest in women because less normative data are available and they can wear constricting underclothes.

Obstructive Chronic Bronchitis

The 13 cases of obstructive chronic bronchitis were found to be divided so that 11 fell into the Index group and 2 among the Controls. Neither in age nor in obesity did they differ from the rest of the females. There was a trend for more of them to have smoked, to a greater extent and for a longer period of time than was average for the total female sample. Two cases had associated ischaemic heart disease and a further two had old tuberculous pulmonary lesions. The majority complained of breathlessness on exertion, to some degree, and half complained of wheeze. The results on the measures of ventilatory capacity showed that obstructive and non-obstructive syndromes were equally divided. The one case of asthma had been previously diagnosed, prior to the screening at a hospital.

Simple Chronic Bronchitis

The 8 cases with simple chronic bronchitis were all smokers, but their consumption was average for the sample. Their average age did not differ from that for the total female

sample.

Impaired Ventilatory Capacity without Symptoms

The 61 cases with impaired ventilatory capacity without symptoms, were divided into 27 in the Index group and 34 in the Control group. As a group they were on average 3 years older than the average for the total female sample. Eighteen cases had associated ischaemic heart disease or hypertension and one case had congenital heart disease with pulmonary hypertension. Two cases had disseminated carcinoma. There were only three abnormal X-ray films, with 2 cases having old tuberculous lesions and 1 of the cancer patients showing lung metastases. Although almost two-thirds of the cases complained of breathlessness to some degree, less than a quarter complained of shortness of breath with wheezing. As with the cases of obstructive chronic bronchitis the values for ventilatory capacity showed that the obstructive and non-obstructive syndromes were divided more or less equally.

Comparison of the means and standard deviations of the measures of ventilatory capacity showed the same trends as between the male Index and Control groups. These are shown in Table 30.

Table 30 Comparison of the Measures of Ventilatory Capacity for the Index and Control Groups.

Measures of Ventilatory Capacity	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
P.E.F.R. litres/min.	351.3	369.7	307.3	342.5	336.1	360.4
Standard Deviation	81.4	59.6	67.8	70.1	79.4	64.4
F.E.V. 1.0 litres	225.5	299.9	178.1	191.5	209.0	216.6
Standard Deviation	55.3	55.9	46.5	44.8	56.8	55.2
F.V.C. litres	295.9	297.6	229.7	252.4	272.5	282.0
Standard Deviation	55.1	53.4	47.7	54.6	61.5	58.1

Although no significant differences were demonstrated, on all values the Index group tended to have lower scores, i.e. in the direction of ventilatory impairment.

Respiratory Symptoms

As with the men, comparisons were made of the proportions in the Index and Control groups with no respiratory symptoms. These are shown in Table 31.

Table 31 The Proportions in the Female Index and Control Groups with and without Respiratory Symptoms.

Respiratory Symptoms	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
No symptoms	17.5	60.0	13.3	30.0	16.1	49.4
With symptoms	82.5	40.0	86.7	70.0	83.9	50.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	57	57	30	30	87	87

There was a significant difference between the number of people with respiratory symptoms in the Index group, as a whole, compared with the Control group. The excess in the Index group was significant ($\text{Chi}^2 = 21.938$; 1 d.f.; $p < 0.001$) and was found with all the respiratory symptoms, which were breathlessness on exertion, cough, phlegm and shortness of breath.

A comparison of respiratory symptoms in those deemed as 'normal' by the M.R.C. classification is shown in Table 32.

Table 32 The Distribution of the Respiratory Symptoms among the 'Normal' Females in the Index and Control Groups

Respiratory Symptoms	40-52 years		53-64 years		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
Breathlessness on Exertion	76.5	20.0	75.0	53.8	76.2	29.2
Cough for less than 3 months	11.8	5.7	-	30.8	9.5	12.5
Phlegm for less than 3 months	11.8	2.9	-	15.4	9.5	6.3
Shortness of breath with wheeze	8.8	8.6	-	15.4	7.1	10.4
Total patients with normal lung function	34	35	8	13	42	48

The figures in this Table do not add up to 100%, because some patients had more than one symptom, whereas others had none. This Table compares the relative proportions, within the Index and Control groups, with symptoms. The difference between the groups was only found with the symptom of breathlessness on exertion, and this was highly significant ($\text{Chi}^2 = 18.880$; 1 d.f.; $p < 0.001$).

Smoking habits, in contrast with the men, differed between the Index and Control groups, although not to a significant degree. Thus, while approximately two fifths of both groups had never smoked, over a quarter of the Index cases and one sixth of the Controls had smoked for more than 25 years. At the time of screening, however, the amount smoked per day was the same among the Index and Control female smokers. As a group the women smoked much less than the men, and consumed 11.5 gms of tobacco daily on average.

The female Index cases paralleled the males in the pattern of respiratory function results. They have a significant tendency to complain more than the Controls and a non-significant trend for more impairment on the tests of ventilatory capacity.

Minor Respiratory Disease

There was an excess of minor respiratory disease among the Index cases. The cases consisted of 4 patients with chronic otitis and 5 of simple chronic bronchitis among the Index group and 4 patients with simple chronic bronchitis among the Controls. There were no patients with chronic sinusitis. This difference was not significant.

Other Minor Disorders

The minor circulatory disorders, minor genito-urinary disorders and benign tumours were equally divided among the two groups whereas disorders of skin, bones and locomotor system, alimentary tract and anaemia were slightly in excess in the Control group. Deafness was fairly common in both Index and

Control groups. Thus 43.7% of Index cases and 25.2% of Controls had audiographic evidence of deafness. In most instances this was high-tone deafness with the patient unaware of the disability. The difference was significant ($\chi^2 = 6.0209$; 1 d.f.; $p < 0.025$).

Comparison of menstrual symptoms and histories showed little difference between the Index and Control groups. Approximately half of each group had stopped menstruation and approximately another quarter had normal menstrual periods. Slightly more Index patients had undergone the menopause (47 patients) than the Controls (42 patients) but not to a significant degree, and more often by hysterectomy (13 patients) than the Controls (6 patients). In contrast 19 of the Control cases had symptoms of heavy or irregular bleeding compared with 13 of the Index cases. The possibility exists that the Index cases had had menstrual symptoms to the same extent as the Controls and that their greater consultation rate had led to more surgical intervention.

The Objective Variables

Most of the comparisons between the groups on the objective variables showed no differences or insignificant differences. Thus there was a slight tendency for the Index group to be smaller and lighter than the Control group on average. However, on Quetelet's Index (the measure of obesity) and the skinfold measures there were no differences.

On the measures of blood pressure the usual increase with age was found and the Index group tended to have higher scores, although these were not significantly different from those of

the Controls. The values are shown in Table 33.

Table 33 The Mean Blood Pressures for the Female Index and Control Groups by Age

Blood Pressure in mm.Hg	40-52 years		53-64 years		Total	
	Index	Control	Index	Control	Index	Control
Systolic	131.2	128.6	155.6	149.3	139.6	135.7
Standard Deviation	22.6	18.5	31.5	24.9	28.3	23.0
Diastolic	76.0	74.2	87.3	84.5	79.9	77.8
Standard Deviation	14.1	12.0	19.7	15.8	17.0	14.2
Pulse	55.2	54.4	67.6	63.4	59.5	57.5
Standard Deviation	14.5	12.3	20.3	18.6	17.7	15.3

It is possible that the blood pressure differences were the consequence of anxiety at the time of examination but overall differences in structural pathology cannot be excluded, especially in view of the fact that of the 18 cases of hypertension in the total male and female samples, 12 were in the Index group. No real differences were found for the other variables examined.

Comparison of Major and Minor Disease Combined

In order to see whether differences between Index and Control group still held when major and minor disease were combined, the proportions with physical disease and totally free from physical disease were determined for the Index and Control groups. This is a stringent test since in the age group examined the chances of being free from any physical disorder have been considerably reduced by the sheer fact of ageing. The

proportions with and without physical illness are shown in Table 34.

Table 34 The Proportions in the Index and Control Groups with and without Physical Disease

Physical Illness	Male		Female		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
Illness Free	16.2	35.2	14.9	25.3	15.3	28.2
Illness Present	83.8	64.8	85.1	74.7	84.7	71.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	37	37	87	87	124	124

Although separately the males and females in the Index group did not have a significantly higher proportion of physical illness (only at the 10% level), collectively the psychiatric sample had a significantly different number of individuals with physical disease of all kinds than the Control group ($\chi^2 = 6.06$; 1 d.f.; $p < 0.025$).

Further, although there were no 'a priori' reasons for placing collections of diseases in rank order, for the purposes of comparison it had some value. The number of conditions by category and individual is shown in Table 35.

Table 35 Major and Minor Physical Conditions by Sex in the Index and Control Groups.

Table 35

Physical Conditions	Male		Female		Total	
	Index %	Control %	Index %	Control %	Index %	Control %
None	16.2	35.2	14.9	25.3	15.3	28.2
1-4 minor conditions	35.2	32.4	20.7	27.6	25.0	29.0
1 major + 1-4 minor conditions	27.0	32.4	36.8	35.6	33.9	34.7
2-4 major + 1-4 minor conditions	21.6	-	27.6	11.5	25.8	8.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Patients	37	37	87	87	124	124

Although the Index group as a whole had significantly more physical disease than the Control group, it can be seen that the differences lay in the absence of physical disorders and in those with multiple conditions. The number of people in each group with minor conditions only and one major condition plus minor conditions was very similar. However, distinct differences were found between the two groups in those free from physical disorder and in those with two or more major plus minor conditions.

The people with multiple conditions of this order comprised one quarter of the total Index sample, and consisted of 8 men and 24 women. They differed from the rest of the psychiatric sample in being significantly older (t test = 4.133; $p < 0.001$). Their average age was 54 compared with 47.8 years for the rest. Also their average Overall Severity score was significantly greater, 27.4, than the rest, 23.2 (t test = 2.583; $p < 0.02$). In other respects there were only trends. More of those with multiple physical disease came from Social Classes

IV and V and more were recognised as suffering from a psychiatric disorder at the screening survey by the general practitioners. In respect of duration, and past history of psychiatric disorder and consultation rates they did not differ from the rest of the sample. The 32 men and women with 2 or more major plus minor conditions, although comprising 25.8% of the total Index sample, suffered from 64.6% of the total major and 21% of the total minor physical disease. The Control patients with 2 or more major plus minor conditions comprised 9.2% of the total Control sample and suffered from 38.6% of the total major and 6.5% of the total minor physical disease. There was a significant difference between the mean age of those with 2 or more major physical plus minor conditions and those with no physical conditions at all. This significant difference was found both for the Index group (t test = 3.6594; $p < 0.001$) and the Control group (t test = 2.834; $p < 0.01$). No other significant differences were found although there was a trend for those with no physical illness, in the Index group, to come from Social Classes I, II, and non-manual III.

These findings would suggest that although the proportion of physical disease, within a group, increases with age, within the psychiatric sample examined the increase was significantly greater than in patients without a psychiatric disorder. Moreover, those with multiple conditions had psychiatric disorders of significantly greater severity than the others in the psychiatric sample.

Known and Unknown Physical Conditions

It is inevitable that during the examination of an association between physical and psychiatric illness the notion of causality should arise. It is important therefore, to consider whether or not the physical conditions were recognised by the patient, since it is arguable that knowledge of a serious physical condition could give rise to an affective disorder. This reasoning is less applicable to any knowledge of a psychiatric illness since, although stress may be an aetiological factor in the development of physical disease, because psychiatric symptoms are usually overt the patient is potentially more probably aware of her mental condition.

When the general practitioner recorded the conditions from which the patient suffered, he also made a note of whether he had previous knowledge of them. It was then possible to make an assessment of the number and type of conditions recognised within the Index and Control groups. Naturally the results are open to error since the patient may have had a condition, of which she was aware, but failed to attend the general practitioner. This difficulty could not be overcome because at the time of the psychiatric interview it was considered better to have no foreknowledge of the physical state and differences in recall and intelligence would have invalidated the findings.

Major Conditions

The proportion of known and unknown major physical conditions within the Index and Control groups is shown in Table 36.

Table 36 The Distribution of Known and Unknown Major Physical Conditions in the Index and Control Groups

Physical Conditions	Male		Female	
	Index %	Control %	Index %	Control %
Known	25.0	8.3	36.0	10.5
Unknown	67.8	83.4	64.0	86.0
Uncertain	7.2	8.3	-	3.5
Total	100.0	100.0	100.0	100.0
Total Conditions	28	12	86	57
Total Patients	37	37	87	87

More conditions were known in the male and female Index groups than in the Control groups. However, since the conditions might have been clustered in a few patients it was necessary to examine the ratio of known to unknown by patient. The distribution is shown in Table 37.

Table 37 The Distribution of the Known and Unknown Major Physical Conditions among the Male and Female Index and Control Groups

Physical Conditions		Male		Female	
		Index %	Control %	Index %	Control %
Known	0	81.1	97.3	70.1	94.2
	1	18.9	2.7	25.3	4.6
	2	-	-	4.6	1.2
Total		100.0	100.0	100.0	100.0
Unknown	0	64.9	73.0	51.7	54.0
	1	21.6	27.0	34.5	36.8
	2	10.8	-	12.6	8.0
	3	2.7	-	1.2	1.2
Total		100.0	100.0	100.0	100.0
Uncertain	0	97.3	97.3	100.0	97.6
	1	-	2.7	-	2.4
	2	2.7	-	-	-
Total		100.0	100.0	100.0	100.0

A significantly greater number of the Index male cases (t test = 2.4538; $p < 0.02$) and Index female cases (t test = 4.3495; $p < 0.001$) than the Controls had major physical conditions known to the general practitioner. The male Index cases also had a non-significant trend for more major physical conditions to be unknown to the general practitioner than the Controls. This last finding was due largely to 5 cases who had 11 conditions between them. A small number of conditions had to be described as 'uncertain', as the practitioner failed to record the necessary information.

The Recognition of Specific Physical Conditions

The diseases were then examined to see whether specific conditions tended to be recognised or not. For both female and male, Index and Control, the greater proportion of the cardiovascular and respiratory disease had been unrecognised by the practitioners. More was unrecognised in the Control group than in the Index group and this probably reflects such factors as a greater consultation rate for the Index cases and perhaps a difference in the threshold of complaint. The high proportion of unrecognised major physical disease is related to both the nature of the conditions and the methods of diagnosis. The ischaemic heart changes were largely diagnosed by electrocardiographic means and since it is known that coronary heart disease is frequently 'silent', it is not surprising that the patient and practitioner were so often unaware of the condition. Similarly the development of chronic bronchitis is a gradual process and unless the patient had frequent chest infections he

may not have attended his doctor, on the assumption that his breathlessness and cough were due to smoking or ageing. The measures of ventilatory capacity can detect impairment very early in the development of the condition.

The remaining conditions which had been unrecognised were 2 cases of thyrotoxicosis and 1 chronic urinary infection, both in the female Index group.

Minor Physical Conditions

The proportion of unknown and known minor physical conditions within the Index and Control groups is shown in Table 38.

Table 38 The Distribution of Known and Unknown Minor Physical Disease in the Index and Control Groups

Physical Conditions	Male		Female	
	Index %	Control %	Index %	Control %
Known	39.0	43.4	40.0	39.0
Unknown	39.0	21.7	49.0	46.8
Uncertain	22.0	34.9	11.0	14.2
Total	100.0	100.0	100.0	100.0
Total Conditions	41	23	65	77
Total Patients	37	37	87	87

Any comparison is vitiated by the number of conditions where it was uncertain whether they had been recognised or not.

The distribution by individual is shown in Table 39.

Table 39 The Distribution of the Known and Unknown Minor Physical Conditions among the Index and Control Groups

Physical Conditions		Male		Female	
		Index %	Control %	Index %	Control %
Known	0	64.9	78.4	71.2	75.8
	1	27.0	16.2	27.6	16.1
	2	8.1	5.4	1.2	5.7
	3	-	-	-	2.4
Total		100.0	100.0	100.0	100.0
Unknown	0	64.9	86.5	70.0	66.7
	1	29.7	13.5	24.2	25.3
	2	2.7	-	4.6	8.0
	3	2.7	-	1.2	-
Total		100.0	100.0	100.0	100.0
Uncertain	0	81.1	78.4	89.6	89.6
	1	13.5	21.6	10.4	8.0
	2	5.4	-	-	2.4
Total		100.0	100.0	100.0	100.0

When examined by individual, the male Index cases had a significantly different average number of unknown minor physical disease than the Controls (t test = 2.379; $p < 0.02$). The females did not show this difference. The finding that the men had more unknown minor physical disease among the Index group is not easy to interpret. It was perhaps related to individual characteristics of patients. The man with 3 unknown conditions was the patient with the moderately severe depression, who did not "want to trouble his doctor". There was a non-significant trend for the male Index cases to have more known illness, which would be in keeping with their higher consultation rate. The unknown diseases included all the body systems, without any one being prominently represented.

Although all the body systems were represented, the

numbers were small and insufficient for comparison, except for gynaecological conditions which were largely unknown, especially in the Index group. The group with multiple physical conditions did not differ from the rest of the sample in the proportions known and unknown to the general practitioner.

Diagnostic Inter-practitioner Reliability

Although this study has the advantage that the physical and psychiatric assessments were made separately, there is the possibility of bias in that whereas the psychiatric conditions were diagnosed by one person, the physical diagnoses were made by five doctors. Thus, should they have varied in their diagnostic habits the results might be misleading. However, allowance was made for this, in the research method, by laying down strict criteria for any diagnosis. Also many of the major diseases, in particular cardiovascular and respiratory disease, were confirmed by objective evidence. Any bias produced by the general practitioner was therefore minimised. However, because of the method of obtaining Index and Control cases, the patients were not evenly divided between the general practitioners. It was important therefore, to consider whether the differences in the amount of physical illness between Index and Control were similar for the five practitioners. The ratios of Index to Control by practitioner are shown in Table 40.

Table 40 The Ratio of Index and Control Patients by General Practitioner

General Practitioner	0	1	2	3	4	Total
No. of Index Cases	44	23	6	26	25	124
No. of Control Cases	25	48	9	20	22	124
Ratio Index/Control	1.76	0.48	0.68	1.3	1.1	1

As previously explained, the cases and Controls were selected as they came to the screening survey in alphabetical order. Matching was carried out retrospectively since it was not possible at the time of screening. No consideration was made concerning which practitioner the patient was attached to, since the addition of this variable would have made matching much more complicated and severely reduced the size of the sample.

Table 40 shows that general practitioner '0' had more Index cases than controls and general practitioner '1' more controls than cases. As previously discussed this was because '0' was a female doctor who had an excess of females on her list and there was a preponderance of females in the psychiatric sample. General practitioner '1' had many of his cases screened during the latter half of the survey when special efforts were being made to collect Control cases. Further this practitioner discouraged psychiatric cases from remaining on his list.

For purposes of comparison the ratio of the mean number of major and minor conditions for the Index cases to the mean number of major and minor conditions for the Control cases can be established for each general practitioner. These are shown in Table 41.

Table 41 The Distribution of Physical Disease by Case among the Index and Control Groups by General Practitioner

General Practitioner		Ratio of Index/Control	Ratio of Means Major, Index/Control	Ratio of Means Minor, Index/Control
0	Male	1.4	3.6	1.2
	Female	1.8	2.5	0.6
	Total	1.7	2.7	0.8
1	Male	0.3	4.0	1.0
	Female	0.5	1.8	0.9
	Total	0.5	2.1	0.9
2	Male	1.0	1.0	1.0
	Female	0.5	0.5	1.2
	Total	0.6	0.5	1.1
3	Male	0.8	3.2	2.8
	Female	1.6	1.1	1.2
	Total	1.3	1.6	1.7
4	Male	3.0	0.6	2.8
	Female	0.7	1.1	0.7
	Total	1.1	0.8	1.1
Total	Male	1.0	2.0	1.8
	Female	1.0	1.5	0.8
	Total	1.0	1.6	1.1

Certain comments can be made upon these results. Firstly, although doctors '0' and '1' had quite different proportions of Index and Control patients among their lists, their diagnostic habits were similar. The high ratio for major physical disease in list '0' was related to the excess of women who had significantly more disease in the Index group compared with the men. Secondly, list '2' was very small, containing insufficient numbers for proper comparison. Thirdly, although lists '3' and '4' had high ratios on minor disease for males and females and males respectively, such factors as some doctors attracting

certain types of patients and age-groups have to be taken into account. Thus list '3' contained more elderly patients than the other groups, which would help explain the excess of minor illness. Any bias introduced by the general practitioner would only affect the minor conditions, since the major ones were all corroborated by objective evidence. The diagnoses of the minor conditions were also subject to strict criteria.

The Correlation between Psychiatric Severity and the Number of Physical Conditions

Although it has been shown that the psychiatric sample had more physical disease than the Control group, this does not indicate whether there is a correlation between the severity of the psychiatric state and the number of physical conditions. One method of measuring physical severity is to obtain the mean scores and standard deviations for major and minor conditions within the various sub-groups. These are shown in Table 42.

Table 42 The Means and Standard Deviations of the Physical Conditions within the Index and Control groups by Age and Sex

Index		Major Physical Disorder	Standard Deviation	Minor Physical Disorder	Standard Deviation
Index					
Males	40-52 yrs (25)	0.64	0.86	1.04	0.84
	53-64 yrs (12)	1.00	1.04	1.25	0.87
	Total means(37)	0.76	0.93	1.11	0.84
Fe-	40-52 yrs (57)	0.74	0.77	0.79	0.84
males	53-64 yrs (30)	1.47	0.97	0.67	0.66
	Total means(87)	0.99	0.91	0.75	0.78
Control					
Males	40-52 yrs (25)	0.32	0.48	0.44	0.60
	53-64 years (12)	0.50	0.80	1.00	1.04
	Total means(37)	0.38	0.59	0.62	0.79
Fe-	40-52 yrs (57)	0.54	0.73	0.82	1.03
males	53-64 yrs (30)	0.86	0.81	1.00	1.02
	Total means(87)	0.65	0.77	0.88	1.03

It can be seen that there was a trend throughout all the groups for the older patients to have more major physical disease than the younger ones. This applied in particular to the females. In contrast, with minor disease, this pattern persisted with the males but not with the females. In order to determine whether psychiatric severity was correlated with the amount of physical disorder, the overall severity score was correlated with major and minor illness. Overall severity score was used as being the most sensitive measure.

Overall for the major conditions there was a positive correlation with psychiatric severity. The correlation was significant at the 5% level for the total male and female sample and for the female 53-64 age-group. In other words, the severity of psychiatric disorder and the amount of major physical disease were positively associated.

In contrast minor physical disease did not show this pattern. The males tended to have positive correlations, in particular the older group, and the women negative correlations. All these correlations were weak and not significant. A low correlation coefficient implies that the variables are not linearly related, although another form of relationship e.g. curvilinear could exist in the data. It may be that for minor illness the relationship with psychiatric disorder did not follow a straight line.

I. The Screening Survey

Screening surveys have now been carried out in several countries but none have devoted the emphasis to psychiatric screening as the St. Paul's Cray Survey. The more usual practice has been to screen for physical morbidity and to limit psychiatric screening to a few items on a questionnaire. The approach at St. Paul's Cray was much more comprehensive. Not only did each patient have to answer the 20 items from the Cornell Medical Index Health Questionnaire, known to discriminate between the psychiatrically ill and well in general practice, but a psychiatrist, the author, was present at each session to administer a clinical interview wherever necessary. This appears, judging by the literature on health screening surveys, to have been a unique situation and allows certain conclusions to be drawn. As previously stated, the primary purpose of this study was to select psychiatric and matched control samples rather than to fully screen a population. However, sufficient experience was gained of this type of screening to consider how well it stood up to the test of applying the screening principles laid down by Wilson and Jungner (1968) and the rigorous criteria of McKeown et al (1968).

It is clear that psychiatric morbidity is an important health problem. Although in the community it is largely composed of minor neurotic disorders and personality difficulties (Shepherd et al, 1966) and is frequently associated with psychosocial problems (Sylph et al, 1969) many of the cases are

chronic and the result is a considerable burden to the community in terms of expenditure and professional time. Furthermore, there are the special and very important problems of suicide and attempted suicide, alcoholism, drug addiction and the psychiatric phenomena found in adolescence and old age. These are naturally very often dealt with at the hospital level but covert cases exist in the community and screening might well provide us with more information in this area.

While it can be established that psychiatric morbidity constitutes a considerable health problem it does not necessarily follow that "prescriptive" screening surveys should be developed on a nation-wide basis. There is insufficient knowledge on the natural history of much of psychiatric disorder, the uncertain existence of pre-symptomatic stages, the acceptability to the general population and the cost-effectiveness of screening. Diagnostic reliability is unsatisfactory and although various forms of treatment are available, the criteria for their use are incomplete. Continuous case-finding has its own peculiar difficulties in psychiatry where the conditions fluctuate and have natural remissions.

For the present, until further evidence is acquired, psychiatric screening should remain at the experimental stage. Enquiry needs to be made into the above areas and valid and reliable instruments for screening should be developed.

Prior to discussing the association between physical and psychiatric disorder it is necessary to digress on the instruments used in this survey and some features of the psychiatric screening.

The Screened Population

Screening surveys have the theoretical advantage that they can randomly sample sections of the community. This permits prevalence of disease to be determined, and should the surveys be repeated, some understanding can be gained of the normal history of disease. However, a disadvantage lies in the failure to obtain complete coverage of the community, due to refusal by a proportion of the population under surveillance. This has been a constant finding in health surveys, despite efforts to overcome this difficulty. Prior to the Bedford Diabetic Survey (1962) the scheme was well publicised throughout the town and yet only 67% were prepared to provide a specimen of urine and 78% of this number were willing to attend for a glucose tolerance test.

The finding in the St. Paul's Cray Study, that 70% agreed to be screened was, therefore, encouraging, especially as it entailed a variety of tests and examinations in two stages. The non-attenders included a group who refused the offer of screening and a group from whom no reply was received. Since the patients were selected from the Executive Council cards it was inevitable that some would have moved or changed doctors. The average movement between practice lists in the London area is 10%. There would, therefore, be patients who had moved prior to the screening and whose cards remained with the practice, and also those who moved during the 9 months of the survey. There was no evidence to suggest that those patients actually refusing screening differed from those screened.

It was realised before the survey started that there would be non-responders and, therefore, there would not be true prevalence rates. This was not a limitation, since the study was not designed with the intention of measuring psychiatric prevalence but rather to make within-group comparisons. Thus, should there be a positive association between physical and psychiatric illness it would be demonstrated in an originally randomly selected population, if the sample was of sufficient size. This turned out to be the case. The task was facilitated by the survey population being fairly homogeneous in demographic terms.

The Matching Procedure

The matching procedure enabled a proper comparison to be made between the Index and Control groups. Thus the two groups were equivalent in the demographic terms of age, sex, marital status and social class. The matching criteria were strict in order to maintain the standard of the design. A small proportion of the identified psychiatric cases could not be matched and the majority of these were widows and divorcees. It is of interest that normal controls could not be obtained for these people and this sub-group requires a study in its own right.

The Initial Screening Instrument

Although the Cornell Medical Index has been found to be deficient, in some respect in community surveys as an operational instrument it was found to be effective in this study. It differentiated between normals and cases to a large extent and the 20% false-positive rate for cases was due to the

threshold being set arbitrarily. Previous information on the questionnaire did not provide precise definition of the threshold for a case. The correlations between the C.M.I. and other measures of psychiatric severity were significant which means that, as a global measure of emotional severity, it has a possible application as a primary screening instrument. Thus, the number of positive responses to items bore a significantly positive relationship with the severity of the psychiatric disorder, particularly with the women. Some of the items discriminated to a greater extent than others but none of these had any characteristics which would have produced a skewed sample. It should be remembered, however, that only high and low scorers were interviewed and that a proportion of the population, scoring positively on 1-4 items, was missed. It is likely that there would have been some psychiatric cases among these patients, but since the primary purpose of the method was to obtain a large number of matched pairs, with maximal psychiatric differences, this group had to be overlooked. In order to be fully assessed, the instrument requires future evaluation on the whole range of scores.

The Clinical Interview Schedule

This instrument was deliberately constructed for epidemiological work. Goldberg et al (1969) have shown that the product-moment correlation and the weighted kappa for each item, except histrionic, had a satisfactory magnitude and the inter-rater reliability was +0.919. Using it during the study enabled a large number of interviews to be carried out. It was

flexible and by having mandatory questions, followed by more searching questions, could assess overall severity and also for individual items, in both cases and normals, with economy of time. The scoring system made it the most sensitive measure of psychiatric severity, since it had a much wider range than the 20 C.M.I. questions and the Observer's rating over a 5-point scale.

The overall scores were very similar for the 40-52 and 53-64 age ranges, both for males and females. The only difference was that the men in the 53-64 age range scored slightly higher than the other groups and had a larger standard deviation. However, this score was based upon only 12 patients. These scores would suggest that, although women appeared to have a greater prevalence of psychiatric disorder in this middle-aged group (a common finding in community surveys), they were not on average more severely ill. Neither did overall age differences appear to be related to severity.

Each item, in addition to contributing to the overall severity, had its own reliability. Subsequently it was useful to obtain the means and standard deviations for the purposes of comparison. The results showed different symptom profiles for sex and age. This was of interest since it enabled the minor neurotic disorders to be defined more explicitly. It is possible that symptom profiles and clustering of symptoms are related to demographic factors and diagnoses from the International Classification of Disease. Consequently, in a future study, the changing patterns of items and diagnoses might be examined over time.

Diagnoses from the International Classification of Diseases
(I.C.D.)

The list of potential diagnoses are listed in Appendix 4. Only a proportion were used. This indicates the limitations of applying the I.C.D. to the minor psychiatric disorders found in general practice. Sex differences again appeared here. The number of cases of personality disorder was significantly greater among the men, and there was a non-significant trend for hypochondriacal neuroses to be commoner among the women. Personality disorder was diagnosed, not according to any prescriptive classification, but either when an affective disorder appeared to be superimposed upon a personality type, for example, an obsessional personality (the majority of cases) or that the behaviour at interview and the history suggested that personality difficulties were the most prominent feature. Hypochondriacal neuroses being commoner in women than men may provide a valid reason for the apparently greater prevalence rate of women during the middle years of life. Women attending the doctor with somatic symptoms and hypochondriacal ideas, are presumably investigated for any underlying physical cause, and when these appear negative, are labelled as "neurotic". Since women have higher average attendance rates than men, this mode of presentation is likely to be common in the doctor's surgery. This finding also illustrates the difficulties encountered in separating physical from psychiatric disorder and attempting to show an association between them, should symptoms be taken at face value. There were trends for the men to have more of the severe forms of depressive illness; for the older groups to

have more depressive neurosis than the younger groups; and phobic neurosis occurred exclusively in the women.

The Recognition of Psychiatric Morbidity by the General Practitioner

The finding that 40% of the men and 52% of the women had psychiatric conditions unrecognised at the time of the screening survey reflects upon factors in three main areas.

First, it reflects upon the method of case identification. As previously shown, prevalence rates in the past have varied enormously, according to the criteria for acceptance and the instruments used. The present study attempted to put the symptoms into meaningful syndromes by means of a psychiatric assessment using an interview schedule with known inter-rater reliability. This allowed for minimal observer bias and it is likely that the cases were reliably diagnosed.

Second, it reflects upon the general practitioner. The diagnosis of a psychiatric condition will depend upon his attitude, skill, experience and types of patients attracted to his list. It would appear from this study, however, as with other forms of morbidity, that only the more severe forms are recognised.

Third, it reflects upon the patients and the nature of the conditions from which they suffer. Although women, in the middle years, have a greater prevalence of psychiatric morbidity than men, in this study a greater proportion of the females were unrecognised. The features of the unrecognised cases were that they were of milder severity, had shorter durations, had had less formal psychiatric treatment and lower average consultation

rates. Assuming that there is a continuum of severity, they would be found at the milder end. Possibly they were unaware that their state was clinically morbid and, therefore, consulted less. Alternatively, those unrecognised at the time of screening, but with past histories, probably included the type of patient described by Abrahamson (1969). These patients had come to terms with their disability and no longer attended their general practitioners.

II. The Association between Physical and Psychiatric Disorder

Overall Comparisons

In view of the size of the sample being compared it was essential that some operational classification of physical disease should be used. Although the age-group was prone to chronic physical disorders, the sample size precluded all but the diseases with large prevalence rates from being represented in numbers sufficient for statistical comparison. The division into major and minor, although arbitrary, allowed for differences in the implications of having physical disease of varying severity. The criterion of major as being 'a threat to or liable to shorten life' may appear open to interpretation, but agreement was found with three other colleagues, as to how to categorise the various physical disorders. The rationale for the separation into major and minor was the theoretical assumption that the association with psychiatric disorder might vary with different orders of physical severity. For instance, ischaemic heart disease was expected to have a more intimate relationship with psychiatric disorder than for example, a sebaceous cyst.

For physical conditions overall, it was found that the average number of major conditions was significantly greater in the male and female Index groups than in the Controls. The difference was greatest in the 53-64 age group, for both sexes, which is presumably due to increasing susceptibility to physical disease with age. The Index cases not only had more major physical disease on average, but fewer people free from physical

disease and more with multiple conditions. The numbers with one condition were similar in both Index and Control groups. Even so, one half of the male Index and one-third of the female Index sample were free from major physical illness compared with two-thirds and one-half respectively, in the Control sample. The distribution of minor physical disease did not follow the same pattern. Although the male Index sample had on average significantly more minor physical disease, this was due to the excess in the 40-52 age group. The females did not show this difference, although there were fewer individuals with no physical disorder and more with one condition in the Index group compared with the Control. It would appear, at least from this sample, that the distribution of physical disease varied according to sex and age. This finding was corroborated on examining the means and standard deviations of major and minor disease within the sub-groups. The females, both old and young, had greater average numbers of major physical disorder than the males. Moreover, they covered more body systems than the men. The older groups of both sexes suffered from more major physical disease than the younger groups. In contrast, the average number of minor illnesses was greater in the male Index groups, particularly the older groups, than in the female Index. The stringent test of examining the proportion in the Index and Control groups, with and without physical disease, showed that there was still a significant difference with the Index group having fewer people free from physical disorder.

Dividing the physical disorders into rank order, although

having no 'a priori' reason was convenient for operational purposes. The comparison on this basis showed that whereas the proportions with minor physical illnesses only, and one major physical disorder plus minor disorder, was very similar between the two groups; the differences showed between the proportions with no physical disease at all and those with two major plus minor disorders. The latter group of people, both in the Index and Control groups, was significantly older than the rest of the sample and the psychiatric group had a mean psychiatric severity which was significantly greater than that for the rest of the sample. This showed a group of individuals in the 6th decade who were vulnerable to all forms of morbidity. They did not differ in other respects from the rest of the sample to a significant degree, although there was a trend for them to come from the Registrar General's lower social classes. Those entirely free from physical disease were significantly younger than those with multiple physical disorders.

The Overall Severity Score, which can be regarded as the most sensitive index of psychiatric severity, was found to be significantly and positively correlated with major physical disorder. The total male and female Index groups separately were only significant at the 10% level but together were significant at the 5% level. In other words, the greater the psychiatric severity the greater the number of major physical disorders. The correlations between Overall Severity score and minor physical disorders did not show this consistent result. Although none of the correlations was significant, the results

varied with the groups. The male and older female groups had positive correlations whereas the younger female and total female groups had negative correlations. Splitting the total sample into older and younger groups showed that the older one had a positive correlation and the younger one a negative correlation. All these correlations were weak and non-significant suggesting that the relationship between psychiatric disorder and minor, even trivial, physical illnesses was of no importance or that it was curvilinear.

Psychosomatic Conditions

Although the concept of specificity of psychosomatic diseases is less widely held than formerly, the disorders traditionally regarded as such were examined for their distribution in the Index and Control groups. Many of the conditions in Sainsbury's Classification (1960) did not appear, but the average number of major psychosomatic conditions was significantly greater in the male and female Index groups than in the Control groups. Sainsbury found that those with psychosomatic disorders were more neurotic and introverted than Controls, and considered the concept of "psychosomatic disease" to be valid. While it was certainly true that the major psychosomatic disorders occurred significantly more often in the psychiatric group, it must be remembered that these conditions also existed in psychiatrically normal people. This would suggest that rather than being specific entities, the psychosomatic disorders tend to be associated with neurotic conditions. Rawnsley (1968) has also emphasised the problems of case self-selection in

psychosomatic research. He considered that convincing evidence of a positive association between somatic pathology and psychological factors could only be answered when the detection of somatic pathology was independent of the subject's decision to seek advice and the measures of somatic pathology were insulated from the effects of attitudes and of reporting set.

There were insufficient minor psychosomatic conditions for comparison, except that gynaecological conditions predominated in the female Controls. A possible reason for this is that more Index cases had undergone the menopause, especially by hysterectomy, and so as a group were less liable to gynaecological disorders.

The Predominant Conditions

Although a wide range of physical conditions was included in the comparison of distributions of disease in the two samples, only two body systems had sufficient numbers for direct comparison. This was related to the size of the samples and the types of chronic physical disorders occurring in the age group examined.

Cardiovascular Disease

The diagnoses of cardiovascular disease were made using definite criteria. In the case of coronary heart disease, the Minnesota E.C.G. Coding was used, and the condition confirmed at the physician's examination, whenever this was possible. Although the E.C.G. items in the Minnesota Coding have varying validity, they all have been found acceptable for the purpose of epidemiological surveys. It is of interest to note that the

point prevalence was very similar to that found by Rose (1962) in his study of English workmen. The majority of the diagnoses were a 'possible ischaemic heart disease', but as Wilson (1968) has pointed out, the question of how successful the E.C.G. is in detecting disease cannot be properly answered yet, because of lack of sufficient post-mortem data. However, Higgins et al (1963) in an epidemiological study of coronary disease found an increased risk of death associated with Q, ST and T-wave abnormalities. They stated that, "though satisfactory correlations between E.C.G. and pathology are largely lacking, the present study strongly suggests that E.C.G. changes which are less marked than those considered classical of myocardial infarction convey a considerably increased risk of dying of arteriosclerosis or degenerative heart disease. In clinical practice the so-called "non-specific" ST - or T - wave changes may indicate rare myocardial abnormalities, electrolyte disturbances, drug intoxication, anoxia, anaemia and haemorrhage. But in the general population such changes are unusual, and for practical purposes the differential diagnosis lies between coronary disease and left ventricular hypertrophy or a combination of the two. From an epidemiological point of view it should be possible to use these much more frequent changes as an index of coronary heart disease". Since the Index and Control groups had equal chances of having E.C.G. changes diagnosed at the screening survey, it must be assumed that real differences existed between the two groups, despite any reservations which might be held about the diagnostic validity of the tests. Furthermore, the

cases with coronary heart disease from the Index and Control groups resembled each other, except for the presence of psychiatric disorder, along several variables. Thus, there was a trend for the males with coronary heart disease to smoke more tobacco daily than their peers and to have higher systolic and diastolic blood pressure values on average. The women with coronary heart disease tended to be more obese, to have higher blood pressure values, and to have higher blood cholesterol, uric acid and blood urea values, and fewer of them were in gainful employment. For the psychiatric patients alone there was a trend for the cases with coronary heart disease to have higher severity scores and for more of the female cases to have undergone the menopause. Thus, it would appear that the cases of coronary heart disease had features, in addition to E.C.G. changes, which singled them out as a group. These features were the 'definite risk factors' summarised by Wilson (1968).

The number of cases of hypertension was rather few and they had no special characteristics other than that the women were more obese than their peers and had higher blood urea levels on average.

The finding that there was a positive association between psychiatric disorder and coronary heart disease confirmed previous work in this field. The subject has been extensively reviewed by Miles (1963), Minc (1965), Russek (1967), Jenkins et al (1967) and Syme and Reeder (1967). The last two edited a symposium on "Social Stress and Cardiovascular Disease" wherein contributions from several disciplines were made. A very

extensive review of the literature was covered by the contributors and Jenkins suggested that the following generalisations could be made about the bio-psycho-social chain of possible coronary heart disease pathogenesis. Laboratory studies using central nervous stimulation, with a variety of stressors, have produced neuroses and atherosclerosis in experimental animals, and elevations in serum cholesterol. There is evidence to suggest that the autonomic nervous system is an active link in atherosclerotic pathology. "Stresses" in the laboratory situation and in real life situations (such as medical students at examination time) have produced elevated serum lipids, (mainly cholesterol, beta-lipoprotein and non-esterified fatty acids). Several studies have shown that there appear to be vulnerable groups, such as culturally mobile people who by personality predisposition are highly reactive to their social situations; people of social and occupational status who most represent the 20th Century ethos. So urban and industrial people and high status businessmen seem to have the highest rates of coronary disease. There have been many descriptions of a coronary-prone personality, and yet there have been fundamental similarities. Adjectives like "aggressive, ambitious, status-conscious, self-critical, emotionally inhibited, and self-driving", recur. Finally, it is suggested that these people, under psychological pressures typical of the Western way of life, are more inhibited and that chronic exposure to mild repetitive events leads to anger and fear.

This is a summary of a large number of studies and has as

its purpose a holistic view of antecedent factors in the development of coronary disease and hypertension. Inevitably, attempts have been made to examine the biochemical chain where the multifactorial aetiology would have its final common pathway. Minc (1965) suggested that the pathogenic link was neurohormonal pathways due to increased catecholamine and steroid output, consequent to sympathetic overactivity since adrenaline has been shown to increase platelet stickiness, reduce clotting time and increase plasma cholesterol during stress. He considered that the coronary patient tends to intellectually control his behaviour and this lacks emotional backing. His "action without emotion" does not favour arousal of the autonomic nervous system. Cardiac adaptation to stress, which is governed by the autonomic nervous system, is less efficient in such a "civilised" pattern of activity". This maladaptation by frequent recurrence or in combination with anatomic factors causes coronary artery narrowing and may produce ischaemic phenomena. Russek (1967) reviewing the chemopathological studies reported that investigators have shown that emotional episodes, perhaps due to cortisone enhancing the effect of adrenaline, cause a rapid mobilisation of non-esterified fatty acids from the body tissues into the circulation. The free fatty acids are irritating, and, in excess, may cause subendothelial haemorrhage and mural thrombi. Stress damages the intima, via the sympathetic adrenergic effects on vascular tissue metabolism, and prepares for subsequent lipid deposits. Prolonged vasoconstriction could reduce

blood flow in the vasa vasorum and produce vascular wall ischaemia leading to increased permeability and intramural oedema. Further, he quoted Raab and Humphries as having shown that catecholamines also diminish myocardial efficiency by wasting oxygen in a disproportionate fashion. Through this action the hormones are capable not only of increasing myocardial vulnerability in the presence of coronary atherosclerosis but also of inducing severe, potentially necrotising myocardial hypoxia in animals with perfectly normal coronary vessels.

This picture is a mixture of experimental data and conjecture, and is far from being substantiated. Although "stress" is clearly implicated in the natural history of coronary heart disease, too often experiments have been uncontrolled. Also the parameters that have been measured, i.e. the 'personality' and catecholamine and steroid levels probably only broadly reflect the underlying body processes.

Attention has also been paid to the converse position. Mai (1968) has reviewed the literature on reactions to infarction and points out that, although adverse psychological reactions seem common, the studies tend to have been on unrepresentative or pre-selected groups. Dovenmuele and Verwoerd (1962, 1963, 1964) examined the incidence of depressive symptoms in hospitalised cardiac patients. They found that the severity of depression was not significantly related to severity of a current cardiac disease but inversely related to the length of physical illness. From their findings, they concluded that early

in the illness, mild and severe cardiac disease are apt to be accompanied by equally severe depressive symptoms; if mild cardiac disease has persisted for more than three years there appears to be some situational response and it is apt to be not accompanied by severe depression. Frequent hospitalisations, even in mild cardiac disease are accompanied by moderate or severe depressive reactions. More severe cardiac illness, but not the milder form, was associated with a higher level of awareness of precipitating factors. The authors concluded that, "in mild cardiac illness, the depressive affect and awareness of factors precipitating the latter is determined more by the individual psychological make-up than is the case in severe cardiac disease where situational factors may have an overriding effect on individual idiosyncrasy".

Testing for associations between diseases by screening a random sample of the population has several advantages. First, it is not dealing with pre-selected samples, measured in the artificial atmosphere of the laboratory or applying animal research to human beings. Second, it is searching for positive connections between common types of morbidity, which might show shared factors. Third, it helps to show the limitations of measuring the usual parameters such as blood pressure and serum cholesterol. Thus, in the St. Paul's Cray study, the coronary heart patients, in the Index and Control groups did not differ from each other on these parameters, but did from their peers without coronary heart disease. The question must, therefore, be asked, why did some coronary heart patients have

a psychiatric disorder and others not? Three lines of enquiry need to be carried out to attempt to answer this question. The group identified as having the two types of disorder could be studied in depth for retrospective evidence of special characteristics. A cohort of patients could be studied prospectively to follow the emergence of the two disease entities. At a further screening survey, a sample of coronary heart patients could be psychiatrically examined to determine the proportion that is mentally ill compared with a demographically matched control group free from coronary heart disease.

Respiratory Disease

The results from this survey, showed that the differences between the Index and Control group lay in the area of symptoms rather than in objective evidence of impaired lung function. As a group, the Index sample gave significantly more positive responses to the respiratory questions than the Control group. Further, those classified as 'normal' on the M.R.C. criteria gave significantly more positive responses to the question regarding breathlessness on exertion. The measures of ventilatory capacity showed a trend towards greater impairment in the Index group compared with the Control, but this did not reach the level of significance. Although some allowance has to be made for the fact that the Index sample suffered from more cardiovascular disease than the Controls, which would possibly influence the response to breathlessness on exertion, it should be remembered that the Index cases had an excess of responses on cough, phlegm and shortness of breath with wheeze. Similar

findings have been demonstrated on confirmed chronic bronchitics attending medical out-patient departments (Faulkner, 1969).

She gave a psychiatric examination to 52 patients, using the clinical interview schedule employed in this study. Any patient with cardiovascular disease was excluded from the series. The group contained both men and women and it was found that 19 cases suffered from a psychiatric disorder in addition. A significantly positive association was shown between the overall psychiatric severity score and the complaint of shortness of breath and a composite score of present symptoms (phlegm, wheeze and shortness of breath). The significance held for the males and the males and females overall. No association was found between symptoms and the peak expiratory flow rates.

As previously noted, the classification of chronic respiratory disease has been bedevilled with problems of criteria. In hospital practice, using sophisticated techniques, some classification into the different types of lung pathology is possible. Even here however, it is recognised that mixed pictures involving chronic bronchitis, emphysema and asthma are found. In the field of epidemiology, it is inevitable that the refinements of diagnosis tend to crumble and satisfactory classification becomes more difficult. The M.R.C. Committee on Chronic Respiratory Disorders considered that while there should be a simple grading, based upon the responses to a standardised questionnaire and the results of the tests of ventilatory capacity in order to help comparisons between population groups, it did not yet seem possible to agree upon which proposed

groups of symptoms indicated 'chronic bronchitis'. Leigh and Marley (1967), in their survey of bronchial asthma in general practice, found that the most difficult differential diagnosis was chronic bronchitis with bronchospasm. Their results showed that the asthma patients and their first degree relatives suffered from a significantly greater amount of chronic respiratory disease than a control population. This applied to males more than females.

Cotes has approached the problem of classification statistically, which helps avoid symptoms but at the same time it must be recalled that his parameters of height and age only account for 60% of the variability about the regression line and, as for example with women, probably even less where the data on normal people are limited. Also the position of one measure of ventilatory capacity cannot predict the position of any other measure. The predictive scores are best for groups rather than individuals. In a random sample of the population with varying but mainly mild forms of respiratory dysfunction, it is unlikely that significant differences would appear.

Although there has been an extensive literature on the relationship between psychiatric illness and asthma (fully reviewed by Leigh and Marley, 1967), that on psychiatric disorder and chronic bronchitis has been sparse. Sklaroff (1963) analysed the records of general practice patients and found an association between chronic bronchitis and psychoneurosis in young men and women but not, in either sex, over the age of 45 years. Farberow et al (1966) made an intensive examination of

the data on patients with respiratory and cardiac disease, who committed suicide while in Veterans' Administration General and Surgical Hospitals and compared them with patients, with the same disease and demographic variables, who had not killed themselves. In general, the suicides seemed to have been more emotionally disturbed, had poorer relationships with the hospital staff and their families and were seen as "problem" patients because of their provoking, complaining and demanding behaviour.

The results of this study using the M.R.C. criteria, have shown that the proportion of people with normal lung function ranged from 30% to 65% depending upon the age, sex and presence of a psychiatric condition. Even so, a considerable number of those deemed as "normal" had symptoms which fell short of the threshold for inclusion as a case. Prevalence surveys have shown a considerable amount of chronic bronchitis in the community. Ogilvie and Newell (1957) in Newcastle-upon-Tyne found a prevalence, for males over 30, of 360/1000 and, for females over 30, of 170/1000. Leigh and Marley divided their chest illnesses into acute and chronic. Collectively the lifetime prevalence rates included nearly a quarter to a third of their sample, depending upon sex and whether the patient had asthma. They made the suggestion that "the presence or absence of certain psychiatric symptoms in chronic chest illness, or again the relationship between socio-psychiatric factors and attacks of bronchitis or other chest infections would all repay study".

The St. Paul's Cray survey had findings which demonstrated

that although symptoms differentiated the Index and Control cases to a significant degree, the objective measures did not. As it is likely that types of pathology elicited by the questionnaire and measures of ventilatory capacity were a mixture of chronic bronchitis, emphysema, asthma and the secondary effects of heart disease it is important that some accurate method should be devised for separating these, in epidemiological work, remembering the bias introduced by the neurotic tendency to complain. Only when this has been achieved can the relationship between psychiatric disorder and chronic respiratory disease be properly examined.

It is of interest to note that the smoking habits did not differ between the male Index and Control groups and only marginally for the women. This is contrary to the popular conception that smoking is a 'nervous' habit and suggests that cultural and personality factors are responsible.

III. The Interpretation of the Findings

The purpose of this study was to test the hypothesis that there is a positive association between physical and psychiatric disorder. The results confirm that this is the case. Previous studies have offered mixed evidence for this association; some have hinted and provided strong evidence for it, whereas others have not demonstrated it. The reasons for these inconsistent findings are likely to be found in biases introduced by the neurotic patients, such as consultation rates and threshold of complaint; the attitudes and practices of the doctors concerned; and the actual measurement of the physical and psychiatric conditions. Thus, whereas neurotic patients, by virtue of their greater consultation rates and habit of complaining in somatic or hypochondriacal terms, could give the specious impression of suffering from organic disease, the doctor in charge of their case could equally well interpret all their complaints as part of their mental state and treat them accordingly without necessarily investigating further. The result, on the one hand, would be a positive association between physical and psychiatric disorder, and on the other hand, no association or a negative one. It is considered that in this study these biases have been eliminated or kept to the very minimum. Random sampling, a Control group, objective methods and strict criteria for diagnosis have been suitable means for limiting the biases.

It has been seen that concurrent with increasing age there was more physical disease. This finding held for male and female, Index and Control. The exception was the female Index

group for minor disease. This discordant finding appeared to be due to the fact that the 40-52 age group suffered from the conditions commonly found in the reproductive years, such as iron-deficiency anaemias, haemorrhoids, varicose veins and genito-urinary disorders, and these numerically offset the general increase in physical morbidity associated with ageing. The increase in physical conditions with age was most marked in the Index women for major disorders, but occurred in excess, for both male and female Index groups, over the Controls. Moreover there appeared to be "clustering" of physical disease. This occurred to a significantly greater extent in the Index group than in the Control group ($p < 0.001$). Thus, 26% of the Index group had 2 major plus minor conditions, compared with 8% for the Controls. The people in whom the physical disease "clustered" were significantly older than the rest of the sample, both for the Controls and Index groups, and for the latter the mean psychiatric severity score was significantly greater. At the other end of the disease spectrum there were significantly more people in the Control group with absolutely nothing wrong with them.

These findings are in accordance with those of Hinkle and Wolff. The "clustering" formed a different pattern in those with and without a psychiatric disorder. This either means that individuals with long-standing psychiatric disorder are subject to all forms of physical morbidity or that in the community there are people who are vulnerable to all types of illness. It is possible that those people in the Control group with multiple

physical disorders could proceed to have a psychiatric disorder in due course. While this cannot be denied, a feature of the Index cases was that they had chronic psychiatric disorders on the whole and therefore it would be expected that should the Control groups be susceptible to psychiatric disorders there would have been some evidence of either neurotic traits or minor psychiatric phenomena by the time the person had reached middle-age.

Other factors, involving personality, attitudes and environmental incidents, not measured in this study, may be aetiological factors. Hinkle found that the "illness prone" group tended to perceive life as difficult and unsatisfactory; they were concerned and "took life seriously"; they tended to be very aware of their own emotional difficulties and marginal social adjustment; they tended to be anxious, self-absorbed, introverted, unduly sensitive, seeking much support and encouragement. It is not certain what this description meant, since it could be applied equally well to abnormal personality types, normal individuals reacting to social stress or persons suffering from the type of long-standing, relatively minor psychiatric disorder found in general practice. This last possibility is supported by the findings of Sylph et al (1969) who showed that a sample of such patients, although not significantly worse off materially than matched controls, were more dissatisfied and coped less well to a significant degree. A further contribution to the subject of the complex inter-play between the individual and his environment was made by Engel

and Schmale, and reviewed in detail by Thurlow (1967). They described a "giving-up given-up" complex as a precursor to disease. This reaction may be of two types, varying to individuals, and either be "helplessness" whereby there is environmental deprivation in which the person must wait for the environment to overcome or replace the loss; or "hopelessness" in which there is a loss created by the person himself and nothing can overcome the loss. It was suggested that these states might be related to increased biological vulnerability, not as a specific cause, but as one of the predisposing factors.

Leigh (1967), as an authority in the field, gave a survey of the present state of psychosomatic medicine in a Presidential address at the Royal Society of Medicine. He dealt with the history of the subject, the contributions of the physiological and psycho-pathological approaches and the resultant intra-professional divisions which had emerged. He deprecated the loss of the holistic attitude towards the patient and recommended a return to the "total comprehension" of the patient. He considered that the ecological field of research was a fruitful area, especially mentioning the work carried out by Wolff. He emphasised the need to teach the subject properly to students and to encourage the understanding that "medicine means the comprehension by the doctor, but not necessarily the patient, of the situation in which the patient finds himself ill, the comprehension by the doctor of the illness itself, its pathology - whether that be a psycho-pathology, a physio-pathology, or a social pathology - and the use of all means at

the doctor's disposal to modify the patient's distress. If this be the case, then the medical student must be shown how life stress, change in life circumstances, pleasurable or painful, greater or lesser, or inner subjective conflicts may initiate or influence the development of illness".

This view indicates the need for the multi-disciplinary approach. The assumptions of the original workers in the psycho-physiological and psycho-analytical fields have not always been confirmed and the results might be said to be disappointing. Too great an emphasis has been placed upon the apparent responses to "stress" by the individual in the experimental situation and too wide an interpretation has been made of individual case-studies. Moreover, there has been a need for a clear definition of the word "stress".

The concept of man reacting, as a totality, to his environment appear to be a preferable model to that which seeks specific causes and effects. The notion of multiple aetiology in disease and multiple responses by man to agents threatening his health is a greater acceptance of the realities of the ecology of ill-health. At the St. Paul's Cray survey, simple models of causality, such as stress specifically causing physical conditions, and the converse, appeared to occur in some instances but could not be said to have happened throughout the Index sample. It should be recalled that the majority of these conditions were unknown to the doctor and most probably to the patient. It cannot, therefore, simply be stated that the psychiatric group was reacting to the presence of physical illness.

The finding that there is a significant and positive association between all types of physical and psychiatric disorder holds promise in several areas. As man reacts with his environment so he succumbs to ill-health and eventually death. There seems to be a differential response among individuals within a community, with some members of that community being 'vulnerable' to illness to a greater extent than their peers. The reasons for this variation in morbidity experience are, at present, complicated and obscure. It is the role of the epidemiologist to elucidate these problems to isolate the "high-risk" groups and to determine the relevant factors. The intimate relationship of physical and psychiatric disorder suggests, at least for ecological research, that these should not be regarded so much as separate entities but as manifestations of ill-health within the organism. The acceptance of this view has research and public health implications.

The role of the epidemiological approach, which by definition is concerned with associations, would be to place stressful situations and subsequent psychological and biological responses on to an aetiological basis. This would not be carried out in isolation, but necessarily be integrated in a multi-disciplinary manner with clinical and laboratory methods. There are manifestly many difficulties, particularly in regard to measuring instruments and satisfactory indices of environmental and behavioural changes. Recently efforts have been directed towards the development of standard units of environmental change which can be objectively and reliably measured.

Rahe et al (1964, 1967) have devised a rating scale for severity of illness based upon the risk of serious disability and threat to life. The environmental changes were expressed in terms of Life-Change Units. From an intensive study of Naval personnel they showed that years of greater than average life-changes had uniformly preceded illnesses or illness-clusters. An even more significant finding was that severe illness and illness-clusters were preceded by more Life Change Units than preceding minor illness.

The epidemiologist can examine the problem further by undertaking prospective studies. A randomly selected cohort would have its physical, psychiatric, genetic and social characteristics measured in the first instance and these parameters would be re-measured over a period of years. The emergence of new disease and the course of disease previously present would be related to demographic and other variables. Health diaries, which have been found to be practicable by Shepherd et al (1966), could be kept by a sample and these would help to study the relationship between domestic events and illness-episodes. Conversely, individuals with a specific condition, for example, coronary heart disease, could have a psychiatric examination at a screening survey, in order to determine whether they suffer from more formal psychiatric disorder and social dysfunction than a group of matched controls.

In the public health field it is a step towards the application of preventive measures. The future role of medical practice lies with prophylaxis, whether it be primary

prevention, i.e. preventing healthy people from developing disease or secondary prevention, i.e. mitigating or eliminating the effects of already established disease. This study has shown that there is a positive association between psychiatric disorder and all types of physical morbidity. Furthermore, some individuals in the community have a clean bill of health and others have multiple disorders. Future efforts must be directed towards learning more about these persons and the environments in which they live.

A preliminary report of some of the findings in this thesis,
entitled,

PSYCHIATRIC MORBIDITY AND PHYSICAL
STATE IN A GENERAL PRACTICE
POPULATION

was presented in a paper given at the W.P.A. - R.M.P.A.
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APPENDICES

Appendix 4

Twenty Items from the Cornell Medical Index Health Questionnaire

Number

- 121 Do you wear yourself out worrying about your health?
- 31 Are you often bothered by thumping of the heart?
- 32 Does your heart often race like mad?
- 80 Does pressure or pain in the head often make life miserable?
- 154 Do you wish you always had someone at your side to advise you?
- 148 Does your thinking get completely mixed up when you have to do things quickly?
- 181 Do you go to pieces if you don't constantly control yourself?
- 146 Do you get nervous and shaky when approached by a superior?
- 187 Do you often shake or tremble?
- 163 Does worrying continually get you down?
- 188 Are you constantly keyed up and jittery?
- 194 Do you often become suddenly scared for no good reason?
- 193 Do frightening thoughts keep coming back in your mind?
- 165 Does every little thing get on your nerves and wear you out?
- 108 Do you often get spells of complete exhaustion or fatigue?
- 113 Do you suffer from severe nervous exhaustion?
- 166 Are you considered a nervous person?
- 158 Do you usually feel unhappy and depressed?
- 161 Does life look entirely hopeless?
- 162 Do you often wish you were dead and away from it all?

Would you describe your general health now as good, fair or poor?

IF FAIR OR POOR:

What are the main things that worry you about your health (apart from what you've already told us)?

Anything else?

IF GOOD:

Is there anything else about your health now that does worry you?

DETAILS OF PRESENT SYMPTOMS OR ILLNESS:

Are you taking any tablets or pills at the moment?

If YES, go on to elicit details:-

Do you get them from your doctor?

How long have you been taking them?

Do you take them regularly?

Have you noticed anything else wrong with your health apart from the things that you've already told me?

(Anything else?)

In the past week, have you been troubled with headache?

or indigestion?

If the rater suspects that psychological mechanisms may be implicated in any of the somatic symptoms described, elicit more details as follows:

How long have you had this trouble?

Does it seem to get worse when your nerves are bad?

How much does it upset you?

How often have you had it in this past week?

SOMATIC SYMPTOMS	4	3	2	1	0
------------------	---	---	---	---	---

ALL PATIENTS:-

Are you at all worried about your health at the moment?

Do you find yourself thinking a lot about your health, or about the workings of any part of your body?

Do you ever worry about having cancer? - or heart disease?

(The following Part 2 rating may be made at this point if the rater wishes)

EXCESSIVE CONCERN WITH BODILY FUNCTIONS	4	3	2	1	0
---	---	---	---	---	---

Have you noticed that you get tired easily?

Or that you seem to be lacking in energy?

If the patient's replies indicate excessive fatigue or energy,
go on as follows:

How long have you noticed this?

Do you feel tired the whole time, or just now and then?

What sort of things do you find most tiring?

Do you feel completely tired out in the evenings?

How has it been this past week?

- Has it stopped you from doing
anything you've wanted to do?

FATIGUE 4 3 2 1 0

What about your sleep?

If reply indicates difficulties, ask for details:

Do you have difficulty dropping off?

Are you restless at night?

Do you wake early?

Have you lost any sleep in the past week?

If the patient's replies indicate loss of sleep in past week, go on as follows:

How long have you had this trouble?

Have you any idea why you can't sleep?

How many nights in the past week have you lost sleep?

How many hours sleep do you think that you miss on a bad night?

SLEEP DISTURBANCE 4 3 2 1 0

ALL PATIENTS:

Do you take any sleeping pills?

If YES, go on to ask:

Do you get them from your doctor?

Do you know what they are called?

Do you take them every night, or just now and then?

How many have you had in the past week?

HYPNOTICS 2 1 0

Do you find that you are easily upset or irritable with those around you?

If the patient's reply indicates irritability, go on as follows:

How long have you been like this?

Are you like it all the time, or just occasionally?

What sort of things upset you?

How has it been in the past week?

Have you had any rows with anyone in this past week?

Are there still any hard feelings?

IRRITABILITY 4 3 2 1 0

Do you find it difficult to concentrate?

Do you get muddled or forgetful?

If replies indicate impairment, go on as follows:

How long have you noticed this trouble?

Do you notice it all the time, or just now and then?

Has it caused any difficulty at home?
or at work?

Can you concentrate on a newspaper or on a play on TV?

How bad has it been in this past week?

- has it stopped you from doing anything?

- how many of your activities are affected?

LACK OF CONCENTRATION 4 3 2 1 0

How have you been feeling in your spirits in the past week?

Have you had spells of feeling sad or miserable?

If the patient's replies indicate despondency or sadness, go on as follows:

Have you felt low the whole time, or just occasionally?

Does it seem connected with anything that happens?

How bad does it get?

Do you ever get weepy?

Can you snap out of it?

Do you sometimes feel hopeless?

Have you felt like making an end to it all?

DEPRESSION	4	3	2	1	0
------------	---	---	---	---	---

If indicated, ask the following questions for the Part 2 rating of depressive thoughts:

Do you ever blame yourself for being like this?

Do you ever find yourself feeling guilty?

Do you sometimes feel inferior to other people?

How do you feel about the future?

DEPRESSIVE THOUGHTS (Part 2 rating)	4	3	2	1	0
-------------------------------------	---	---	---	---	---

Would you say that you are a highly strung or nervous person?

Do you ever find that you get anxious or frightened for no good reason?

Do you worry a lot about things?

If the patient's replies indicate anxiety and worrying, go on to ask more:

What sort of things do you chiefly worry about?

Have you always been like this, or is it something that has only started recently?

Do you worry all the time, or only now and then?

Do you find yourself worrying more than you need about little things?

Have you been very upset by worries in the past week?

ANXIETY 4 3 2 1 0

Are there any special things or situations that you find frightening or upsetting?

What about being alone in the house?

- going out by yourself?
- travelling on buses or trains?
- animals? insects? heights? the dark?

If patient's replies indicate any phobias, go on to elicit details, viz:

How severe is this?

Do you get it all the time, or just now and again?

How bad has it been in this past week?

Do you have to go out of your way to avoid - or alter your usual activities in any way?

PHOBIAS 4 3 2 1 0

Do you ever find that you have to do things over and over,
to make sure that you've done them right?

Or that you keep having unwelcome thoughts that you can't
get rid of?

(If patient asks what is meant: Well, any sort of unpleasant
thought that comes into your
mind against your will.)

Do you find it hard to make decisions?

If the patient's replies indicate possible obsessions or
compulsions, ask appropriate questions from the following:

(CHECKING)

How many times do you find yourself checking your work?

Do you check it even though you know that it's right
really?

Are there any other things that you find yourself having
to do a number of times?

(UNWELCOME THOUGHTS)

Can you describe them to me?

(DIFFICULTY WITH DECISIONS)

Is this something that you've always had, or is it
something new?

Is it just over important issues, or does it affect
trivialities as well?

ALL PHENOMENA

Do you try and struggle against it?

Is it very distressing?

Does it take up much of your time?

How bad has it been in this past week?

OBSSESSIONS AND COMPULSIONS 4 3 2 1 0

Do you ever get the feeling that you're not really there?
Or that everything around you seems unreal?

If patient's replies indicate possible depersonalisation, go
on to elicit details, viz:

Can you describe the feeling?

Do you find it unpleasant or frightening?

Do you get it every day, or just now and again?

How long does it last when you get it?

How bad has it been just lately? (in this past week?)

DEPERSONALIZATION 4 3 2 1 0

Is there anything else to do with your health that you think
might be important?

- or anything I haven't asked you about?

FAMILY PSYCHIATRIC HISTORY**BRIEF PERSONAL AND SOCIAL HISTORY**

Name of Rating: Reason for Morbid Rating: Rating Assigned

SLOW, lacking
spontaneity 4 3 2 1 0

SUSPICIOUS,
defensive 4 3 2 1 0

HISTRIONIC 4 3 2 1 0

DEPRESSED 4 3 2 1 0

ANXIOUS tense 4 3 2 1 0
AGITATED

ELATED euphoric 4 3 2 1 0

FLATTENED
INCONGRUOUS 4 3 2 1 0

DELUSIONS
misinterpretations 4 3 2 1 0
THOUGHT DISORDER

HALLUCINATIONS 4 3 2 1 0

INTELLECTUAL
IMPAIRMENT 4 3 2 1 0

The following ratings may already have been made:

EXCESSIVE CONCERN
WITH 4 3 2 1 0
BODILY FUNCTION

DEPRESSIVE
THOUGHTS 4 3 2 1 0

Interviewer's Notes:**Summary and Formulation:****Assessment of the Reliability of the Information:**

GOOD / FAIR / POOR

I.C.D. DIAGNOSIS:

Principal Diagnosis:

Ancillary Diagnosis:

Over-all Severity Rating:

4 3 2 1 0

Appendix 3

Criteria for Further Examination, Investigation and Diagnosis of Physical Conditions

1. Anaemia

Abnormal result was when the haemoglobin was below 11.5 gms in women and 12.0 in men. Iron deficiency anaemia was diagnosed when at least one of the following was satisfied:

- a) M.C.H.C. below 30 mgs %.
- b) Proof of excessive loss of malabsorption of iron.
- c) Response to iron therapy.

Investigation of the cause was always carried out.

A provisional diagnosis of macrocytic anaemia was made when the haemoglobin value was below the above thresholds and a M.C.V. of more than 95 cubic microns. Further investigations included a history, an examination of the appropriate systems, a serum B12 and a test for folic acid deficiency in these cases.

2. Hypertension

Diastolic 2 was used to indicate the degree of hypertension. An abnormal result was when the mean of the two Health Centre and general practitioner readings was above 100 mm.Hg. Should this be the case, then the cardiovascular system and the fundi were examined.

Investigation of the serum electrolytes, renal system and catechol amines followed for everyone with a diastolic 2 more than 100 mm.Hg for the 40-49 age-groups, and more than 120 mm.Hg for the 50-64 age-group.

3. Ischaemic Heart Disease

Definite ischaemic heart disease was diagnosed when there was a positive history of angina or previous coronary thrombosis and when the E.C.G. changes according to the Minnesota Coding were groups 1:1, 1:2 or 7:1. Possible ischaemic heart disease was diagnosed when the codings were 1:3, 4:1-2-3, 5:1-2-3.

4. Peripheral Vascular Disease

A positive response to the questions concerning intermittent claudication led to an examination of the posterior tibial and dorsalis pedis pulses in both legs and if these were absent then the disease was diagnosed. If the patient was below the age of 55, a consultant opinion was sought.

5. Alimentary Tract

The state of the mouth and teeth was examined during the basic examination and any caries, gingivitis or other lesions noted. Two specimens of stool with positive occult blood tests or a history of frank bleeding within the previous 6 months or diarrhoea led to a full history and examination of the alimentary tract. Consultant opinion was always sought as necessary.

6. Urinary Tract

An abnormal result, in this system, was when the blood urea was higher than 50 mgs.%, or that positive answers were given to the questions on urinary symptoms. Any nocturia or dysuria was then investigated by bacterial examination of the urine and haematuria during the last six months by cystoscopy at the hospital. Histories suggesting prostatic hypertrophy in men,

and prolapse in women led to full examination of the genito-urinary system.

7. Diabetes

An abnormal random blood sugar reading was taken as more than 150 mgs.%. Following this finding a two-hour sugar loading test was given and if this was positive, a glucose tolerance test was carried out. A case was diagnosed as diabetic when the two-hour blood sugar was more than 200 mgs. Additionally, the cardiovascular, neurological and ophthalmological systems were examined for evidence of complications.

8. Vision

Vision at six metres equal or worse than 6-18 but which improved to 6-6 or 6-9 with the pin-hole test were referred to an optician for correction of refractive error. If unimpaired with the pin-hole test, then the general practitioner re-examined and referred the patient to a consultant as necessary. Defective near vision was referred to an optician only if it interfered with daily life. Field defects always warranted further examination by the general practitioner and, as required, a specialist opinion.

9. Hearing

Abnormal audiometry results required an examination with an auroscope and if indicated, an E.N.T. opinion.

10. Arthritis

Abnormal results were positive responses on the questionnaire; limited movement; pain on movement; swelling or distortion of

joints elicited on examination; raised serum uric acid with a past history of joint pain. Investigations included a full history, local examination of the joints, and laboratory tests. Definite diagnoses were made for the different types of arthritis on the basis of the following assessments:

Rheumatoid Arthritis - the presence of two or more of the following:

- a) History of one or more episodes of joint pain involving three or more joints.
- b) Joint changes in at least three limb joints, two of which had to be symmetrical and at least one had to be in either hand, wrist or foot.
- c) A positive test for rheumatoid factor.

Gout - the presence of two of the following:

- a) A history of two acute attacks of pain in a limb joint.
- b) Serum uric acid over 7 mgs.%.
c) The presence of tophi.
- d) A definite history of a good response to colchicine.

Osteoarthritis

Typical X-ray findings of osteoarthritis.

11. Respiratory Disease

Criteria for diagnosis was a positive reply concerning whether the patient brings up phlegm for three months each winter and abnormal respiratory function tests. These were:

F.E.V. 1	Men less than 2.5 litres.
	Women less than 2.0 litres.
P.E.F.R.	Men less than 350 litres per minute.
	Women less than 300 litres per minute.

12. Obesity

For the purpose of the survey people were regarded as obese according to standard charts using life insurance figures.

A further measure was that of skinfold whereby those falling into the top 10% of the population distribution curve would be regarded as obese. However, for this study, Quetelet's Index was considered to be a more precise measure of obesity.

13. Serum Cholesterol

A level of more than 300 mgs.% was regarded as being abnormal.

14. Uric Acid

A level above 6 mgs.% for women and 7 mgs.% for men required a repeat. Any result above 8 mgs.% was an abnormal result.

Appendix 4

The Diagnostic Categories considered appropriate for general-practice psychiatric morbidity with coding numbers from the Glossary of Mental Disorders (1968).

Psychoses

- 290-294 Organic psychosis (including dementia)
- 295 Schizophrenia (all types, including schizo-affective psychosis)
- 296 Affective psychosis (including hypomania, depressive and manic-depressive psychosis)
- 297 Paranoid states.
- 298 Psychosis - other.

Neuroses

- 300.0 Anxiety neurosis.
- 300.1 Hysterical neurosis.
- 300.2 Phobic neurosis.
- 300.3 Obsessive-compulsive neurosis.
- 300.4 Depressive neurosis.
- 300.7 Hypochondriacal neurosis.

Other

- 301 Personality disorder (all types)
- 303-4 Alcoholism and drug dependence.
- 310-15 Mental retardation.

- 000 No psychiatric diagnosis.

Appendix 5

Example 1

Example of a Personality Disorder

Male Patient aged 48

History and Presenting Complaints

This patient claimed to have had chronic bronchitis for 25 years since having had pneumonia while serving as a Royal Marine at Scarpa Flow during the Second World War. In addition, at interview, he complained of having had diarrhoea for two months and cramp in his legs at night for two years. In response to the psychiatric interview questions he admitted to being a highly strung individual and that he had considerable domestic difficulties. He and his wife had not been able to have children, due to his infertility, and despite having adopted a child the lack of natural children had always been a source of contention between the patient and his wife. She now resisted all his efforts to have sexual relations.

In the past the patient had been treated for alcoholism and a depressive illness by the general practitioner.

Family and Personal History

The patient's father had been diagnosed as suffering from neurasthenia. The patient was born and reared in London. He described his development as uneventful. He had always been a hairdresser and for the past 17 years had run his own business. During the last war he served in the Royal Marines. He had an adopted daughter aged 18.

Examination Findings

He was dyspnoeic and cyanosed but insisted on smoking during the screening. His manner was histrionic and uninhibited although he had not taken any alcohol. Despite these characteristics he was anxious at interview and concerned about his physical health. He scored morbid ratings on anxiety and somatic symptoms for Reported Symptoms; and on histrionic, anxiety, and excessive concern with bodily functions for Manifest Abnormalities. It was considered that this patient suffered from a Personality Disorder and attendant anxiety.

His Overall Psychiatric Severity score was 23.

The Physical Disorders from which he suffered were chronic bronchitis, ischaemic heart disease, varicose veins and chronic otitis media.

Example 2

Example of a Hypochondriacal Neurosis and Somatic Symptoms

Female Patient aged 46

History and Presenting Complaints

This lady said that she had always been nervous, but that lately her condition had worsened. She had become muddled, no longer could concentrate and had had to give up her job as a part-time shop assistant 3 weeks earlier. She thought a lot about her health and lately, after finding lumps in her breasts, was convinced that she had cancer. Her heart often seemed to be pounding at a rapid rate, she had a crawly feeling in legs and she frequently had a pain which travelled from her stomach to her neck and back, which kept her awake at night. These sensations alarmed her and although she had been thoroughly examined by her general practitioner, her anxieties had not been allayed. Additional to these worries the patient reported that her sleep had been poor for many years, that she was always tired during the day and that she was phobic about travelling and crossing roads. For the past month she had been prescribed imipramine by her doctor.

Family and Personal History

There was no family history of psychiatric disorder. The patient was born in Dorset and reported her birth and subsequent development as having been normal. She had married, at the age of 23, to a foreman engineer and had had two children.

Examination Findings

At interview she was a tense and tired looking person. She scored morbid ratings on somatic symptoms, fatigue, sleep

disturbance, irritability, despondency, anxiety and phobias for Reported Symptoms; and anxiety, and excessive concern with bodily functions for Manifest Abnormalities. It was considered that this patient suffered from a long-standing anxiety state with marked hypochondriacal features and multiple phobias.

Her Overall Psychiatric Severity Score was 29.

The Physical Disorder from which she suffered was deafness.

Example 3

Example of a Moderately Severe Anxiety State with Phobic Anxiety

Female Patient aged 42

History and Presenting Complaints

This patient complained of feeling tense, lacking in confidence, being afraid to do things, being unable to go out of the house by herself or remain there alone for any length of time, recurrent indigestion and a lump in her throat. The lump had been brought on by the news of the assassination of Martin Luther King. She had been phobic for eighteen months and had a prior episode three years earlier when she attended a London teaching hospital. She described herself as being constantly anxious, often to the point of panic. Sometimes she would wake up during the night following a nightmare and had to seek relief by recounting the dream to her husband. She was always tired, slept badly, frequently felt weak and had attacks of vertigo.

Family and Personal History

Her mother and two of her siblings had been treated as in-patients at psychiatric hospitals. She described her upbringing as "terrible" and that she was one of 12 children, all of whom were unwanted. She had married at the age of 21 and had had two children. Her husband was a senior clerk.

Examination Findings

At interview she was tense, sweaty and blotchy faced. She scored morbid ratings on somatic symptoms, fatigue, sleep disturbance, irritability, anxiety and phobias, for Reported Symptoms; and anxiety for Manifest Abnormalities. It was considered that she suffered from a moderately severe anxiety

state with disabling phobic anxiety.

Her Overall Psychiatric Severity Score was 19.

The Physical Disorders from which she suffered were ischaemic heart disease and varicose veins.

Example 4

Example of an Obsessional Neurosis

Male Patient aged 49

History and Presenting Complaints

This man dated the onset of his psychiatric illness as the previous year after he had had Bornholm disease. Since that time he had been depressed and apathetic, was easily 'het up', had lost $1\frac{1}{2}$ stones in weight, could not concentrate as well as usual and was irritable with his family. He had always been a perfectionist but since being ill had begun to check his work three to four times on each occasion (he was a maintenance engineer), washed his hands frequently throughout the day and had an undressing ritual at night which caused him to take 20 minutes to get to bed. He found this new pattern of behaviour distressing and struggled against doing it.

Previous to this illness, he had not suffered from any formal psychiatric order. Ten years earlier he had had a peptic ulcer diagnosed. This had been treated by diet, and was largely in remission, although he still occasionally had symptoms.

Family and Personal History

There was no family history of psychiatric disorder. The patient was born in London. His birth and development were uneventful other than that he was enuretic until the age of 10 and as a child was afraid of the dark. He had done several jobs during his lifetime, mainly as a skilled artisan, and had served in the Navy during the Second World War. He was married with two children.

Examination Findings

On examination he was a pleasant approachable man who was tense at interview. He scored pathological ratings on fatigue, irritability, lack of concentration, depression, phobias and obsessions and compulsions for Reported Symptoms; and anxiety and depressive thought content for Manifest Abnormalities. It was considered that this patient had had an exacerbation of pre-existing obsessional personality traits, and had developed an obsessional neurosis in an affective setting.

His Overall Psychiatric Severity Score was 24

The Physical Disorders from which he suffered were varicose veins and peptic ulcer.

Example 5

Example of an Affective Disorder following a Myocardial Infarction

Male Patient aged 45

History and Presenting Complaints

This patient had had a myocardial infarction the previous year and continued to suffer from angina. He had become easily fatigued, tense and agitated and wondered how he could cope with financial matters, running his home and carrying on with his job. He could not concentrate properly and no longer could read the newspaper, watch television or do domestic chores. He was irritable and frequently rowed with his wife. He was in very low spirits and often wondered whether it was worth while carrying on living. He had thought of taking aspirin and finishing it all and at other times had thought of dropping everything and going to the other end of the earth. He found these thoughts distressing and struggled against them. He was taking glyceryl trinitrate and valium as treatment for his condition from the general practitioner.

He had no previous history of psychiatric disorder, but had always been a fussy man. He liked to lead an orderly life and at home would often straighten the furniture.

Family and Personal History

There was no family history of psychiatric disorder. The patient was born and reared in London and had an uneventful development. He had been employed for many years as a bus driver, but because of his condition had been relieved of his driving duties and was employed about the bus depot. He had

married at the age of 24 but his wife had died of kidney disease. He remarried at the age of 40. He had one child.

Examination Findings

On examination he was a man who looked older than his years and appeared ill. He scored morbid ratings on fatigue, irritability, lack of concentration, despondency, anxiety and obsessions for Reported Symptoms; and anxiety, depression and depressive thought content for Manifest Abnormalities. It was considered that this patient had developed a depressive reaction to having ischaemic heart disease.

His Overall Psychiatric Severity Score was 40.

The Physical Disorder from which he suffered was ischaemic heart disease.

Example 6

Example of Major Physical Disorders in a Patient with Long-standing Affective Disorder

Male Patient aged 52

History and Presenting Complaints

This man had developed a psychiatric illness 5 years earlier. It started with depression and anergia. He received E.C.T. as an in-patient at the local mental hospital. Since then he had had mood swings and in all had had 4 admissions to hospital for further treatment. In addition to having episodes of depression he had spells when he became excessively cheerful and would go out and buy things in abundance. He continued to attend the local psychiatric out-patient clinic, and had recently been on a course of amitryptiline. At the time of being seen he was taking no medication. However, psychiatric symptoms were elicited. He complained of excessive fatigue, irritability, impaired concentration and a constant feeling of being sad and miserable. He felt that he did not do his work properly because of excessive fatigue and felt guilty about it. He considered himself inferior to his workmates because he did not have a trade. He had found that he had become much more indecisive, since the onset of his illness, when depressed. He had recently begun to think a great deal about the prospects of dying.

Family and Personal History

There was no family history of psychiatric disorder. The patient was born in London and had a normal development. He was employed as a maintenance fitter. He had married at the age of

22 and had had 3 children.

Examination Findings

On examination he was manifestly depressed. He scored morbid ratings on fatigue, sleep disturbance, irritability, lack of concentration, despondency and obsessions and compulsions for Reported Symptoms; and depression and depressive thought content for Manifest Abnormalities.

His Overall Psychiatric Severity Score was 33.

At the screening survey it was confirmed that he suffered from ischaemic heart disease, chronic bronchitis, varicose veins and chronic otitis media. It was considered that this patient not only suffered from a moderately severe form of affective disorder but also had demonstrable multiple physical disorders.

Appendix 6

MALE INDEX - Aged 53-64 years		Age Height		F.E.V.1.0		P.E.F.R.		F.V.C.		F.E.V.%	
Diagnosis	Yrs	Metres	O.	E.	D.	O.	E.	D.	O.	E.	D.
Obstructive C.B.	63	1.7	142	280	2SD	168	540	2SD	320	385	1SD
Obstructive C.B.	60	1.8	242	325	1SD	323	550	2SD	342	445	1SD
Obstructive C.B.	62	1.7	225	275	1SD	424	520	1SD	305	380	1SD
Obstructive C.B.	59	1.7	155	290	2SD	213	520	2SD	300	390	1SD
Reduced v.c.only	59	1.8	255	310	1SD	328	530	2SD	287	420	2SD
MALE INDEX - Aged 40-52 years											
Obstructive C.B.	52	1.7	227	310	1SD	461	540	1SD	317	400	1SD
Obstructive C.B.	44	1.8	310	380	1SD	317	590	2SD	405	325	N
Obstructive C.B.	52	1.7	197	310	2SD	226	540	2SD	270	270	N
Reduced v.c.only	46	1.8	135	350	3SD	318	575	2SD	147	450	3SD
Reduced v.c.only	43	1.8	NK	-	-	285	575	2SD	-	-	-
Asthma	41	1.7	275	350	1SD	371	560	2SD	397	430	N
Simple C.B.	42	1.8	380	380	N	495	600	1SD	510	485	N
Simple C.B.	40	1.8	350	390	N	445	600	2SD	480	490	N
Simple C.B.	44	1.7	322	340	N	568	550	N	395	430	N
Simple C.B.	48	1.8	322	360	N	441	585	1SD	342	470	2SD
									71	73	N
									76	75	N
									73	72	N
									92	75	N
									-	-	-
									69	77	1SD
									74	76	N
									75	77	N
									85	75	N
									94	74	N

KEY: C.B. = chronic bronchitis; V.C. = ventilatory capacity; SD = standard deviation;
O = observed; E = expected; D = distribution. The relation between observed and
expected is either within 1SD (Normal = N), more than 1SD, more 2SD, more than 3SD.
NK = not known.

MALE CONTROL - Aged 53-64 years	Diagnosis by patient	Age Height Yrs Metres	F.E.V.1.0 in litres		P.E.F.R. litres/min.		F.V.C. litres		F.E.V.%						
			O.	D.	O.	E.	D.	O.	E.	D.					
MALE CONTROL - Aged 53-64 years	Obstructive C.B.	61	1.8	212	320	2SD	466	550	1SD	262	440	3SD	81	69	N
	Obstructive C.B.	55	1.6	80	270	3SD	232	500	3SD	190	350	2SD	42	71	3SD
	Reduced v.c.only	58	1.7	215	295	1SD	293	525	3SD	337	395	1SD	64	70	N
	Simple C.B.	60	1.8	297	305	N	567	530	N	380	430	N	78	70	N
	Simple C.B.	54	1.8	295	340	N	468	565	1SD	410	455	N	72	71	N
MALE CONTROL - Aged 40-52 years	Reduced v.c.only	51	1.7	242	315	1SD	335	540	2SD	400	410	N	60	73	1SD
	Reduced v.c.only	45	1.7	215	335	2SD	450	550	1SD	320	435	1SD	67	75	1SD
	Reduced v.c.only	40	1.7	222	350	2SD	365	570	3SD	272	435	2SD	82	77	N
	Reduced v.c.only	46	1.7	277	330	1SD	338	550	2SD	367	420	N	75	75	N
	Simple C.B.	49	1.7	267	305	N	484	525	N	347	390	N	77	74	N
	Simple C.B.	51	1.7	350	315	N	564	540	N	405	410	N	86	73	N
	Simple C.B.	49	1.7	250	320	1SD	422	540	1SD	357	415	1SD	70	74	N
	Simple C.B.	49	1.7	250	320	1SD	409	540	1SD	365	415	N	69	74	N
	Reduced v.c.only	51	1.7	242	315	1SD	335	540	2SD	400	410	N	60	73	1SD

KEY: C.B. = chronic bronchitis; V.C. = ventilatory capacity; SD = standard deviation;
O = observed; E = expected; D = distribution. The relation between observed and expected is either within 1SD (Normal = N), more than 1SD, more than 2SD, more than 3SD. NK = not known.

FEMALE INDEX - Aged 53-64 years		Diagnosis by patient	Age Height Yrs Metres	F.E.V.1.0 in litres			P.E.F.R. litres/min.			F.V.C. litres			F.E.V.%		
				O.	E.	D.	O.	E.	D.	O.	E.	D.	O.	E.	D.
	61	1.50	Obstructive C.B.	95	180	2SD	116	320	2SD	122	210	2SD	78	76	N
	61	1.58	Obstructive C.B.	195	200	N	265	345	1SD	257	240	N	76	76	N
	59	1.52	Obstructive C.B.	127	185	1SD	213	330	1SD	170	220	1SD	75	77	N
	57	1.55	Reduced v.c.only	150	200	1SD	346	350	N	235	240	N	64	77	2SD
	54	1.73	Reduced v.c.only	160	250	2SD	356	420	N	210	320	2SD	76	78	N
	54	1.65	Reduced v.c.only	120	230	2SD	273	290	N	200	290	2SD	76	78	N
	57	1.27	Reduced v.c.only	220	160	N	291	190	N	265	175	N	77	77	N
	57	1.55	Reduced v.c.only	165	200	N	325	350	N	197	240	1SD	84	77	N
	59	1.47	Reduced v.c.only	205	175	N	281	310	N	252	200	N	81	77	N
	62	1.52	Reduced v.c.only	95	180	2SD	198	320	1SD	170	215	1SD	79	76	N
	53	1.58	Reduced v.c.only	177	215	N	359	360	N	197	260	1SD	90	78	N
	54	1.58	Reduced v.c.only	135	250	2SD	220	360	2SD	185	320	3SD	73	78	N
	58	1.55	Reduced v.c.only	145	195	1SD	348	350	N	190	235	1SD	76	77	N
	55	1.63	Reduced v.c.only	105	225	3SD	249	380	1SD	200	275	1SD	53	78	3SD
	53	1.65	Reduced v.c.only	155	230	1SD	261	390	2SD	235	290	1SD	66	78	2SD
	61	1.58	Reduced v.c.only	177	200	N	325	350	N	245	240	N	72	76	N
	54	1.58	Reduced v.c.only	180	215	N	244	360	1SD	240	260	N	75	78	N
	59	1.65	Reduced v.c.only	145	220	1SD	240	375	2SD	187	280	2SD	78	77	N
	59	1.58	Reduced v.c.only	148	200	1SD	340	350	N	170	245	1SD	85	77	N
	56	1.60	Simple C.B.	272	215	N	345	370	N	275	260	N	99	77	N
	59	1.58	Asthma	212	200	N	340	350	N	255	245	N	83	77	N

FEMALE INDEX Aged 40-52 years			F.E.V.1.0 in litres			P.E.F.R. litres/min.			F.V.C. litres			F.E.V.%		
Diagnosis by patient	Age Height Yrs Metres		O.	E.	D.	O.	E.	D.	O.	E.	D.	O.	E.	D.
Obstructive C.B.	45	1.52	142	220	1SD	223	340	1SD	187	250	1SD	75	80.5	1SD
Obstructive C.B.	42	1.55	225	235	N	270	380	1SD	310	275	N	73	81.5	1SD
Obstructive C.B.	51	1.55	162	215	1SD	257	360	1SD	237	250	N	68	63	N
Obstructive C.B.	41	1.60	155	250	2SD	235	400	2SD	260	295	N	60	81.5	3SD
Obstructive C.B.	48	1.60	102	230	3SD	181	380	3SD	175	275	2SD	58	80	3SD
Obstructive C.B.	47	1.60	115	235	3SD	280	390	1SD	197	280	2SD	58	80	3SD
Obstructive C.B.	48	1.60	185	230	1SD	350	385	1SD	275	280	N	67	79.5	2SD
Obstructive C.B.	48	1.55	NK	-	-	79	365	3SD	NK	-	-	NK	-	-
Reduced v.c. only	52	1.52	190	220	N	386	340	N	225	235	N	84	78.5	N
Reduced v.c. only	52	1.52	187	200	N	324	340	N	257	235	N	73	78.5	1SD
Reduced v.c. only	51	1.58	130	220	2SD	200	370	2SD	237	265	N	84	79	N
Reduced v.c. only	40	1.60	195	250	1SD	363	400	N	280	300	N	70	81.5	2SD
Reduced v.c. only	45	1.58	180	235	1SD	362	380	N	245	275	N	73	80.5	1SD
Reduced v.c. only	48	1.52	160	210	1SD	349	350	N	180	245	1SD	89	79.5	N
Reduced v.c. only	51	1.63	197	230	N	237	390	2SD	302	285	N	65	79	2SD
Reduced v.c. only	43	1.63	195	250	1SD	402	400	N	230	300	1SD	85	81	N
Reduced v.c. only	46	1.63	190	245	1SD	307	400	1SD	267	295	N	71	80	1SD
Reduced v.c. only	52	1.65	125	235	2SD	229	390	2SD	312	290	N	40	78.5	3SD
Reduced v.c. only	43	1.65	152	255	2SD	212	410	3SD	215	310	2SD	71	81	1SD
Simple C.B.	44	1.65	270	255	N	393	410	N	297	310	N	90	81	N
Simple C.B.	43	1.65	310	255	N	489	410	N	395	310	N	78	81	N
Simple C.B.	46	1.73	260	270	N	463	440	N	342	340	N	76	80	N
Simple C.B.	45	1.55	225	225	N	306	370	N	317	260	N	71	80	1SD

FEMALE CONTROL - Aged 53-64 years		Age Height Yrs Metres		P.E.V.1.0 in litres		P.E.F.R. litres/min.		F.V.C. litres		F.E.V.%	
Diagnosis by patient				O.	E. D.	O.	E. D.	O.	E. D.	O.	E. D.
Reduced v.c. only	61	1.52		190	180 N	316	325 N	275	215 N	69	76 1SD
Reduced v.c. only	59	1.55		140	195 1SD	286	340 N	335	235 N	42	77 3SD
Reduced v.c. only	53	1.58		120	215 2SD	230	360 2SD	157	260 2SD	76	78 N
Reduced v.c. only	55	1.60		180	215 N	309	370 N	210	265 1SD	86	78 N
Reduced v.c. only	59	1.63		195	215 N	279	370 1SD	280	270 N	70	77 1SD
Reduced v.c. only	55	1.60		190	215 N	359	370 N	270	260 N	70	78 1SD
Reduced v.c. only	64	1.68		177	217 1SD	377	380 N	212	280 1SD	83	75.5 1SD
Reduced v.c. only	58	1.47		82	175 2SD	211	310 1SD	150	200 1SD	55	77 3SD
Reduced v.c. only	56	1.55		150	200 1SD	285	350 1SD	235	240 N	64	77.5 2SD
Reduced v.c. only	54	1.52		135	200 1SD	300	340 N	160	230 1SD	84	78 N
Reduced v.c. only	53	1.47		155	190 N	290	320 N	172	215 1SD	90	78 N
Reduced v.c. only	53	1.55		180	210 N	279	350 1SD	230	250 N	78	77 N
Reduced v.c. only	62	1.58		162	197 N	370	340 N	200	240 1SD	81	76 N
Reduced v.c. only	62	1.55		197	190 N	302	335 N	245	230 N	80	76 N
Reduced v.c. only	53	1.60		140	220 2SD	293	370 1SD	182	270 2SD	77	78 N
Simple C.B.	54	1.58		215	215 N	370	360 N	275	260 N	78	78 N
Simple C.B.	59	1.58		205	200 N	341	350 N	245	245 N	84	77 N

FEMALE CONTROL - Aged 40-52 years		F.E.V.1.0 in litres		P.E.F.R. litres/min.		F.V.C. litres		F.E.V.%	
Diagnosis by patient	Age Height Mrs Metres	O.	E. D.	O.	E. D.	O.	E. D.	O.	E. D.
Obstructive C.B.	51 1.58	195	220 N	328 370 N	240 260 N	81 79 N			
Obstructive C.B.	48 1.68	165	250 2SD	248 410 2SD	245 305 1SD	67 80 2SD			
Reduced v.c. only	42 1.58	182	240 1SD	311 390 1SD	220 280 1SD	83 81 N			
Reduced v.c. only	50 1.52	147	205 1SD	382 350 N	292 240 N	50 79 3SD			
Reduced v.c. only	52 1.60	180	222 1SD	355 373 N	230 270 1SD	78 79 N			
Reduced v.c. only	52 1.65	195	235 1SD	325 395 1SD	295 290 N	66 79 2SD			
Reduced v.c. only	48 1.63	182	240 1SD	331 400 N	282 290 N	65 80 2SD			
Reduced v.c. only	45 1.58	167	235 1SD	415 380 N	275 275 N	61 80 3SD			
Reduced v.c. only	47 1.58	122	230 3SD	353 380 N	245 270 N	50 80 3SD			
Reduced v.c. only	50 1.60	190	228 N	343 380 N	260 275 N	73 79 1SD			
Reduced v.c. only	52 1.65	165	235 1SD	280 395 1SD	247 290 1SD	67 79 2SD			
Reduced v.c. only	49 1.58	160	225 1SD	398 370 N	200 270 1SD	80 79 N			
Reduced v.c. only	44 1.50	195	215 N	289 350 N	235 245 N	83 81 N			
Reduced v.c. only	46 1.65	172	250 2SD	320 410 1SD	215 305 2SD	80 80 N			
Reduced v.c. only	43 1.63	260	250 N	295 400 1SD	312 300 N	83 81 N			
Reduced v.c. only	45 1.58	195	235 1SD	307 380 1SD	257 275 N	76 80 N			
Reduced v.c. only	45 1.60	210	240 N	262 390 1SD	275 285 N	76 80 N			
Reduced v.c. only	43 1.52	197	222 N	366 360 N	232 255 N	85 81 N			
Reduced v.c. only	47 1.63	127	242 2SD	387 400 N	257 295 1SD	49 80 3SD			
Reduced v.c. only	52 1.68	115	242 3SD	290 400 1SD	165 300 3SD	70 78.5 1SD			
Reduced v.c. only	40 1.58	140	245 2SD	352 395 N	282 285 N	50 82 3SD			
Simple C.B.	44 1.68	222	260 N	320 420 1SD	305 320 N	73 81 1SD			

Appendix 7

Statistical Tests of Significance

The Product Moment Correlation Coefficient

This examines pairs of variables for linear association between them. Each coefficient was tested to determine whether it significantly differed from zero.

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

The Student's t Test

This tests for differences between two sample means.

	Sample 1	Sample 2
Mean	\bar{x}_1	\bar{x}_2
Variance	s_1^2	s_2^2
Size	n_1	n_2

Then t test is

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{1/n_1 + 1/n_2}}$$

s^2 the pooled estimate of variance, is

$$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 1} \quad \text{and} \quad s = \sqrt{s^2}$$

The t test assumes that the samples are independent and normally distributed. Where the assumption of normality was clearly not met the less powerful χ^2 test was used. All t tests were two tailed.

The Normal Distribution Test

This tests for differences between two sample means. The data is as above.

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

The assumption is that the samples are independent.

Chi² Test

This test was used for testing for significant differences between qualitative variables and in cases where the normality assumption of the t test could not be met. For tables with 1 degree of freedom all expected frequencies were greater or equal to 5 and for tables with more than 1 degree of freedom, one expected frequency between 1 and 5 was allowed for each 5 cells in the table.

$$\text{Chi}^2 = \frac{(O - E)^2}{E}$$

The statistical analysis was carried out using the Omnibus programme on the IBM 7094 computer at Imperial College, London.

SOUTH-EAST LONDON SCREENING STUDY

PART III. PHYSICIAN'S EXAMINATION

Survey Number

G.P.

Surname

Forenames

Address
.....
.....

Date of Birth:

Day Month Year

Previously Known Diseases

1. Diabetes NO / YES Treatment:— Diet / Oral Hypgl. / Insulin
2. Cardiovascular or peripherovascular disease ... NO / YES Diagnosis
3. Hypertension NO / YES Treatment:— No / Drugs / Other
4. Rheumatic Fever/St. Vitus Dance NO / YES Date(s)
5. Chronic Respiratory Disease ... NO / YES Diagnosis
- (other than Tuberculosis)
6. Arthritis NO / YES Diagnosis
7. Urinary Infection/Kidney Disease NO / YES Diagnosis
8. Tuberculosis NO / YES Site(s)
- Date of diagnosis Still under observation YES / NO
- Treatment
9. Malignant Disease NO / YES Diagnosis
- Date of diagnosis Treatment
10. Nervous Breakdown NO / YES Diagnosis
- Treatment (including hospital).....
11. Operations (excluding dental and other minor, unless relevant) NO / YES
- (a) Date Operation
- (b) Date Operation
- (c) Date Operation
12. Other Hospitalisation
- (a) Date Diagnosis
- (b) Date Diagnosis
13. Other Relevant Diseases
- (a)
- (b)

Relevant Family History

.....

.....

.....

Physician: Date:

I want to ask you some questions about any illnesses you have had in the past. I may know about these already, but let's go over them again for the record.

Have you ever had sugar diabetes?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Do you have to keep to a diet?	...	...	...	...	...	...	...	...	...	NO / YES
Are you on any tablets or insulin injections?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had rheumatic fever or St. Vitus Dance?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had any heart trouble?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Do you know what was the matter?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES',	.....								
Are you on heart or water tablets for this?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had high blood pressure?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Are you on tablets or pills for this?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had infection of your bladder or kidneys?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had any other kidney trouble?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Do you know more exactly what this was?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES',	.....								
Have you ever had Tuberculosis?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Was it chest or elsewhere?	.....								
When was it discovered?	..... years ago									
Are you still seeing a doctor or chest clinic for this?	...	...	...	...	...	...	...	...	...	NO / YES
Have you ever had a nervous breakdown?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', Were you in hospital for this illness?	...	...	...	...	...	...	...	...	...	NO / YES
What treatment did you have?	.....								
Have you ever had an operation?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', When was it?	.....								
What was it for?	.....								
Have you ever been in hospital for any other illness?	...	...	...	...	...	...	...	...	...	NO / YES
If 'YES', When was it?	.....								
What was it for?	.....								
Have you ever had any other serious illnesses?	NO / YES
If 'YES', What were they?									
									
									

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BASIC EXAMINATION

1. Mouth (remove dentures)

		Abnormal	
		Site	Lesion
Tongue	Normal		
Palate	Normal		
Cheek/Floor	Normal		
Gingival	Normal		
Teeth	Normal		

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2. Skin

(Examine face, limbs and exposed trunk) NORMAL / ABNORMAL

(a) Lesion

Site(s)

(b) Lesion

Site(s)

(c) Lesion

Site(s)

3. Herniae

[illegible][illegible]

Left NO / YES

.....

.....

.....

4. Varicose Veins

											Right	Left
Varicose Veins	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
If 'YES':—Phlebitis	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Excema	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Ulceration	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Oedema	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES

5. Arthritis

(Put + for positive finding, 0 for negative)

	Right			Left		
	Pain on Movement	Distortion	Limitation	Pain on Movement	Distortion	Limitation
Hands (inc. fingers)						
Wrists						
Knees						
Hips						
Ankles						
Feet						
Other						

“Distortion” means any bony or soft tissue deformity, subluxation or ankylosis.

FOR WOMEN ONLY

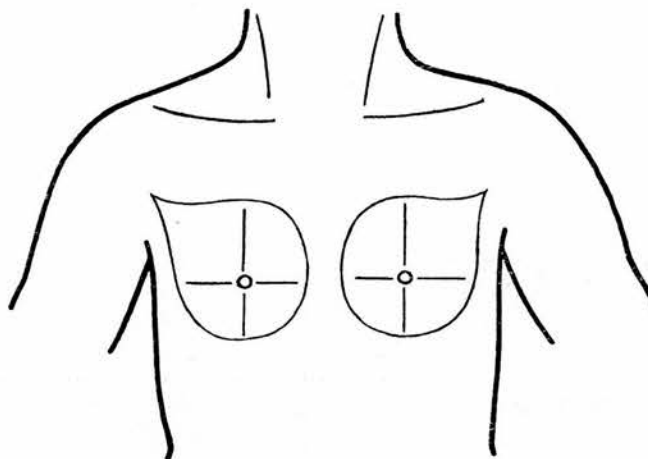
6. Breast and Pelvic

Breasts Taught self-examination NO / YES

L.M.P.

Lumps NO / YES

If 'YES', Site (mark on drawing)



Size:

Tethering NO / YES

If 'YES', To skin NO / YES

To muscle NO / YES

Palpable lymphatic glands NO / YES

Site (mark on drawing)

Character.....

.....

.....

7. Pelvic Examination

History:

Discharge NO / YES

Colour

Offensive NO / YES

Intermenstrual bleeding in the last year NO / YES

Position in cycle: Quantity

Precipitating factors (if any)

Postmenopausal bleeding in the last year NO / YES

Last episode weeks ago Quantity

Precipitating factors (if any)

Vulva NORMAL / ABNORMAL

Site Lesion

Vagina NORMAL / ABNORMAL

Prolapse NO / CYSTOCELE / RECTOCELE / TOTAL DESCENT

Stress Incontinence NO / YES

Cervix NORMAL / ABNORMAL

Lesion

Uterus NORMAL / ABNORMAL

If 'ABNORMAL', Size Shape

Mobile NO / YES

Adnexae NORMAL / ABNORMAL

Tenderness NO / YES Site

Masses NO / YES Site

Other

Cervical Smear TAKEN / NOT TAKEN

Signed for NO / YES

FURTHER EXAMINATION

ARTHRITIS

(With joints of hands and feet give group involved only—e.g. proximal or distal phalangeal, metacarpo or metatarso phalangeal).

Length of History years

Episodes of symptoms SINGLE / RECURRENT / CONTINUOUS

Maximum number of joints involved in any one episode

(With groups of joints—e.g. distal interphalangeal, each group = one joint)

Symptoms during episodes

(If positive finding put +, if no abnormality 0)

Involved Joints (Give side)	Stiffness	Pain	Swelling	Other
1.				
2.				
3.				
4.				
5.				
6.				

Stiffness: Time of day MORNING / EVENING / ALL DAY

Duration each day hours

Functional Disability (during exacerbations and at time of examination)

	Walking		Stairs		Dressing		Feeding	
	Exac.	Now	Exac.	Now	Exac.	Now	Exac.	Now
Normal								
Restricted—no help								
Restricted—help								
Unable to do								

'Help' means mechanical and/or human aid.

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.....

Examination

Put + if abnormality is present; 0 if no abnormality

Joints (give side)	Pain	Soft Tissue Swelling	Limitation of Movement	Subluxation or Ankylosis
1.
2.
3.
4.
5.
6.

Other Findings:—

Bursitis NO / YES Site(s)

Tenosynovitis NO / YES Site(s)

Gouty Tophi NO / YES Site(s)

Heberden's Nodes NO / YES Site(s)

Rashes

Psoriasis NO / YES

Other NO / YES

Investigations (Ring investigations carried out)

E.S.R.

W.C.C.

Repeat Uric Acid

Latex Test

X-Ray

Other

CARDIOVASCULAR SYSTEM

Hypertension Only

If diastolic disappearance is over 100 mg on two occasions at the screening clinic, repeat Blood Pressure:—

If all three diastolic disappearance are over 100 mg proceed:—

Hypertension, Ischaemic Heart Disease and Undiagnosed Dyspnoea

History

History of chest pain NO / YES

If 'YES', Length of History years months

Site of pain

Radiation

Duration hours minutes

Actions or drugs giving relief

Dyspnoea NO / YES

Type of shortness of breath PANTING / SIGHING / WHEEZING

Nocturnal Dyspnoea NO / YES

Precipitating cause (if any)

.....

Ankle swelling NO / YES

Examination

Central cyanosis NO / YES

Ankle Oedema NO / YES

Jugular Venous Pressure inches above sternal notch

Heart rate per minute REGULAR / IRREGULAR

Heart sounds 1st NORMAL / ABNORMAL—2nd NORMAL / ABNORMAL

If 'ABNORMAL', detail:—

.....

.....

Heart murmurs NO / YES

If 'YES', Specify:

.....

.....

Peripheral Pulses:—

	Right	Left
Femoral	PRESENT / ABSENT	PRESENT / ABSENT
Post Tibeal	PRESENT / ABSENT	PRESENT / ABSENT
Dorsalis Pedis	PRESENT / ABSENT	PRESENT / ABSENT

Fundi (for Hypertension)

Fundi NORMAL / ABNORMAL / NOT SEEN

Changes:—

Grade I	Arterioles narrow and irregular	Increased light reflex	... ..	NO / YES
Grade II	Grade I + A/V nipping	... ..	... ..	NO / YES
Grade III	Grades I and II + exudates an/or	Haemorrhages	... ..	NO / YES
Grade IV	Papilloedema + Grade III	... ..	... ..	NO / YES
Other ocular abnormalities	... ..	... ..	... ..	NO / YES

Investigations

Hypertension

For those under 50 years: If diastolic disappearance is 100 mg Hg or more

For those 50 years and over: If diastolic disappearance is 120 mg Hg or more

repeat blood urea

catechol amine excretion (24 hour urine)

intravenous pyelogram

midstream urine

DIABETES

History

Thirst	...	...	...	...	...	NO / YES	
Pruritis	...	...	...	...	NO / YES	Site	.....
Leg Pains	...	...	...	...	NO / YES		
Numbness of feet	...	...	...	...	NO / YES		

Examination

Central Nervous System

Knee jerk	NORMAL / DECREASED / INCREASED
Ankle jerk	NORMAL / DECREASED / INCREASED

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Eyes

Fundi—diabetic changes:—						NORMAL / ABNORMAL / NOT SEEN
Grade I	Microaneurisms and/or punctate haemorrhages	NO / YES
Grade II	Grade I + punctate exudates	...	...	...	...	NO / YES
Grade III	Grade II and 'cotton wool patches'	...	...	...	...	NO / YES
Grade IV	Marked venous changes, large or small haemorrhages	...	...	...	...	NO / YES

Lens	NORMAL / OPACITIES
	Character
Other ocular abnormalities	... .. NO / YES
	Lesion

Vascular System—Do examination of peripherovascular disease on opposite page

Investigations

Glucose Tolerance Test

M.S.U. Biochemistry

Culture

Microscopy

PERIPHEROVASCULAR DISEASE

History

Pain—character
site and sides
Duration hours minutes
precipitating causes
drugs or actions giving relief

Examination

								Right	Left
Pulses—Tibialis Anterior	...	...	...	...	...	...	...	ABSENT / PRESENT	ABSENT / PRESENT
Dorsalis Pedis	...	...	...	...	...	...	...	ABSENT / PRESENT	ABSENT / PRESENT
Other Pulse(s)	...	...	...	...	...	...	...	ABSENT / PRESENT	ABSENT / PRESENT
Feet	Temperature.....								
								Right	Left
Atrophic skin	...	...	...	...	...	...	...	NO / YES	NO / YES
Atrophic nails	...	...	...	...	...	...	...	NO / YES	NO / YES
Hairloss	...	...	...	...	...	...	...	NO / YES	NO / YES

.....
.....
.....

Investigation

If below 55 years (or if indicated in those between 56-64 years), refer for further investigation.

ANAEMIA

History

For iron deficiency anaemia

[illegible]

If 'YES', Length of History years months

Quantity of Blood lost per episode

Frequency of episodes

[illegible]

If 'YES', Name of drug:—

Quantity (in tablets) week

All Anaemias

Diet: Are any of meat, liver, kidneys or eggs eaten daily NO / YES

If 'NO', are these foods eaten daily:—

green vegetables NO / YES

bread and/or porridge NO / YES

[illegible][illegible]

For Macrocytic Anaemias

History of parasthesiae, numbness, weakness or clumsiness	NO / YES
---	-----	-----	-----	-----	-----	----------

If 'YES', symptoms

limbs involved

Examination

For all anaemias

If epistaxis—Nose NORMAL / ABNORMAL

All other

Abdomen

[illegible]

Detail

[illegible]

..... fingers below costal margin

Masses **NO / YES**

Site

[illegible]

Site

If rectal bleeding

[illegible]

Proctoscopy	...	...	...	...	...	...
	NORMAL / HAEMORRHOIDS / OTHER					

Investigation

Ring if investigation is carried out:—

Repeat occult blood

Serum B.12

X-ray—Ba meal

Figlu

Ba enema

Other

Other Tests:—

ALIMENTARY TRACT

History

Indigestion NO / YES

If 'YES',—Site

precipitating cause

flatulence NO / YES

heartburn NO / YES

Vomiting NONE / COFFEE GROUNDS / BLOOD / OTHER

Bowel habit:—changes in last year NO / YES

Maleana in past year NO / YES

Diarrhoea in past year NO / YES

precipitating factors

accompanying symptoms

accompanying blood and/or mucous NO / YES

Examination

Masses NO / YES Site

Tenderness = NO / YES Site

Perianal skin NORMAL / ABNORMAL

Lesion

Per rectum—Anal fissure NO / YES

Mass NO / YES

If 'YES', specify

Proctoscopy NORMAL / ABNORMAL

If 'ABNORMAL', Haemorrhoids NO / YES

Other lesions

Investigations (ring if carried out)

Ba enema

Ba meal

Other

URINARY TRACT

History

History of painful micturition NO / YES

SINGLE / RECURRENT / CONTINUOUS

Length of History years

Date of last episode

Associated with Nocturia NO / YES

Haematuria during the last year NO / YES

Dates:—

Position in stream EARLY / LATE / THROUGHOUT

Associated with—Dysurea NO / YES

Fever NO / YES

Loin Pain NO / YES

FOR MEN ONLY

Difficulty in starting micturition NO / YES

Poor stream NO / YES

Associated with nocturia NO / YES

If 'YES', Nocturia night

Examination

Abdomen:

	Right	Left
Enlarged kidneys	NO / YES	NO / YES

Size Shape

	Right	Left
Tender kidney	NO / YES	NO / YES

Bladder palpable suprapubically NO / YES

FOR MEN

Per rectum

Prostate—size NORMAL / ABNORMAL

tender NO / YES

consistency

Investigations (ring if carried out)

M.S.U.

I.V.P.

Acid Phosphatase

Repeat Blood Urea

Alkaline Phosphatase

RESPIRATORY SYSTEM

History

Wheezing

Past history asthma NO / YES

Age of onset years

Date of last attack years ago

Is the asthma seasonal NO / YES

Season

Cough

Length of history years

Dyspnoea

Length of history years

Haemoptysis in last year NO / YES

Quantity:—

History of exposure to asbestos, silicone, coal dust, etc. NO / YES

Examination

Clubbing of fingers NO / YES

Nose—polypi NO / YES

discharge NO / YES

Throat—post nasal drip NO / YES

Enlarged lymphatic glands NO / YES

Site

Character

Respiratory System—Barrel chest NO / YES

Auscultation—wheezes NO / YES

Site

crepitations NO / YES

Site

Investigations

Ring if carried out:—

Sputa X 3

Nasal Swab

Full size X-ray

P.A.

Lateral

Other view

THYROID

History

Temperature—prefers	...	...	...	...	SUMMER / WINTER
sweats easily	...	...	...	...	NO / YES
Mood	...	...	...	...	NORMAL / IRRITABLE / SLOW
Weight variation	...	...	...	...	NONE / LOST WEIGHT / GAINED WEIGHT
Amount: lbs in months					
Appetite	...	...	...	...	NORMAL / GOOD / POOR
Bowel habit	...	...	...	...	NORMAL / DIARRHEA / CONSTIPATED
Palpitations	...	...	...	...	NO / YES
Hair loss	...	...	...	...	NO / YES
Menstruation	...	...	...	...	NORMAL / AMENORRHOEA / FLOODING

Examination

Thyroid glands—palpable	...	...	...	NO / YES
If 'YES', Size	.....		
Shape	.....		
Skin	...	...	...	NORMAL / HOT / MOIST / DRY
Hair	...	...	...	NORMAL / ABNORMAL
Pulse rate	..... per minute			
rhythm	...	...	...	REGULAR / IRREGULAR
Finger tremor	...	...	...	NONE / FINE / COARSE
Eyes—suborbital oedema	...	...	...	NO / YES
exophthalmos	...	...	...	NO / YES
lidlag	...	...	...	NO / YES
Other findings:				

Investigations: (Ring if carried out)

Thyroid antibodies

Other

HEARING

History

Discharging ear or recurrent earache	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES
Tinnitus	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES
Vertigo	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES
Associated headache	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES

Examination

														Right	Left
Wax	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Otitis externa	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Drum: perforation	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
discharge	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
Tuning fork test:—															
type of loss—nerve	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES
conductive	...	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	NO / YES

VISION

... .. NO / YES NO / YES

Opthalmic Examination

Cornea:	right	NORMAL / ABNORMAL	left	NORMAL / ABNORMAL											
	lesion	.....												
Lens:	right—opacities	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	
	left—opacities	...	...	...	...	...	...	...	...	...	...	...	...	NO / YES	
Posterior Chamber:															
	floating bodies	NO / YES	
Fundus:	disc	NORMAL / ABNORMAL	
	lesion													
Retina:	NORMAL / ABNORMAL	
	lesion													

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Investigation

If cataract or retinopathy—glucose tolerance test.

ALCOHOL

Consumption

Beer	...	...	...	...	..... pints per day
Wine	...	...	...	...	..... glasses per day
Sherry	...	...	...	...	..... glasses per day
Spirits	...	...	...	...	..... tots per day, OR
Bottles	...	...	...	...	..... per week

History

Psychiatric History (if necessary)

History

[illegible]

Abnormalities diagnosis or statement of conditions found:—

1.
2.
3.
4.
5.

[illegible]

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Referral NO / YES

If 'YES', Consultant

Specialty

Hospital

[illegible]

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Reasons for giving treatment or advise if it is not required by the Criteria:—

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TIME TAKEN FOR EXAMINATION MINUTES

SOUTH-EAST LONDON SCREENING STUDY

Date of Invitation:

Date of Screening:

Survey No.

G.P.

SURNAME: Miss
Mrs.
Mr. Sex M/F

FORENAMES:

ADDRESS:

..... Tel.:

Age years

Date of Birth:
Day Month Year

Civil State: S / M / W / D / Sep.
(Please ring appropriate category)

Occupation (Men and Women) present or last job
Industry or Trade

Work State: F.T. / P.T. / R / N.W.
(Please ring appropriate category)

Women only: Husband's present or last job
Industry or Trade

FOR OFFICE USE ONLY

Tick section when it has been carried out

Questionnaire —

Audiometry —

Blood Pressure —

Ht. & Wt. —

C.X.R. —

Respiratory Tests —

Skinfold —

Bloods —

Vision: Acuity —

E.C.G. —

G.P. Examination —

Fields —

Appointment —

Attended —

PART 1. QUESTIONNAIRE

INSTRUCTIONS ON ANSWERING

These questions are asking about your present and recent health and wellbeing. Please circle the answer which is right, thus: **YES** / NO. Try to answer all the questions on these pages. At the end there is a space to add any additional symptoms that are now troubling you.

-
- Do you have difficulty in reading small print? ... YES / NO
(with spectacles if you have them)
- Do you have difficulty in seeing distant objects? ... YES / NO
(with spectacles if you have them)
- Do you have difficulty in hearing and understanding most things people say, without seeing their face or lips? ... YES / NO
- Have you found it difficult to concentrate recently? ... YES / NO
- Does your hand often shake when you try to do something? ... YES / NO
-
- Are you ever troubled by shortness of breath when hurrying on the level or walking up a slight hill? YES / NO
- Do you get short of breath when walking with other people at an ordinary pace on level ground? YES / NO
- How many flights of stairs can you climb without stopping? ... 0 / 1 / 2 / 3 / 4
- Do you sweat very easily, even on cold days? ... YES / NO
- Are you troubled with a frequent or persistent cough? ... YES / NO
- Do you usually cough first thing in the morning in the winter? ... YES / NO
- IF 'YES', Do you cough like this on most mornings for as much as three months each winter? YES / NO
- Do you usually bring up any phlegm from your chest first thing in the morning in the winter? ... YES / NO
- If 'YES', Do you bring up phlegm like this on most mornings for as much as three months each winter? ... YES / NO
- Have you ever had attacks of shortness of breath with wheezing? ... YES / NO
- Do you suffer from palpitations or breathlessness? ... YES / NO
- Do you ever have blackouts, dizzy spells or faints? ... YES / NO
-
- Have you ever had any pain or discomfort in your chest? ... YES / NO
- If 'YES', Do you always get it when you walk uphill or hurry? ... YES / NO
- Does it pass off quickly if you stop still or slow down? ... YES / NO
- Have you ever had a severe pain across the front of your chest lasting for half-an-hour or more? ... YES / NO
- Do you ever have severe pain in either leg on walking? ... YES / NO
- If 'YES', Does the pain ever wear off while you are still walking? ... YES / NO

Do you get pain in any of your joints?	...	...	...	...	...	...	...	...	...	YES / NO
Do you have swelling in any of your joints?	...	...	...	...	...	...	...	...	...	YES / NO
Do you wake up with stiffness or aching in your joints or muscles?	...	...	...	...	...	...	...	...	...	YES / NO
Are you more absent minded recently than you used to be?	...	...	...	...	...	...	...	...	...	YES / NO
Do you have difficulty in getting off to sleep?	...	...	...	...	...	...	...	...	...	YES / NO
Do you get up every night to pass water?	...	...	...	...	...	...	...	...	...	YES / NO
If 'YES', How many times?	...	...	...	...	...	...	...	...	...	1 / 2 / 3 / 4 / 5 / 6
Do you have any pain or difficulty on passing water?	...	...	...	...	...	...	...	...	...	YES / NO
Have you ever passed blood in your water?	...	...	...	...	...	...	...	...	...	YES / NO
Are you troubled with piles (haemorrhoids)?	...	...	...	...	...	...	...	...	...	YES / NO
Are you troubled with frequent loose bowel motions?	...	...	...	...	...	...	...	...	...	YES / NO
Have you any lumps, cysts or unusual swellings anywhere on your body?	...	...	...	...	...	...	...	...	...	YES / NO
Are you troubled by waking in the early hours and being unable to get off to sleep again?	...	...	...	...	...	...	...	...	...	YES / NO
Do you wear yourself out worrying about your health?	...	...	...	...	...	...	...	...	...	YES / NO
Are you often bothered by thumping of the heart?	...	...	...	...	...	...	...	...	...	YES / NO
Does your heart often race like mad?	...	...	...	...	...	...	...	...	...	YES / NO
Does pressure or pain in the head often make life miserable?	...	...	...	...	...	...	...	...	...	YES / NO
Do you wish you always had someone at your side to advise you?	...	...	...	...	...	...	...	...	...	YES / NO
Does your thinking get completely mixed up when you have to do things quickly?	...	...	...	...	...	...	...	...	...	YES / NO
Do you go to pieces if you don't constantly control yourself?	...	...	...	...	...	...	...	...	...	YES / NO
Do you get nervous and shaky when approached by a superior?	...	...	...	...	...	...	...	...	...	YES / NO
Do you often shake or tremble?	...	...	...	...	...	...	...	...	...	YES / NO
Does worrying continually get you down?	...	...	...	...	...	...	...	...	...	YES / NO
Are you constantly keyed up and jittery?	...	...	...	...	...	...	...	...	...	YES / NO
Do you often become suddenly scared for no good reason?	...	...	...	...	...	...	...	...	...	YES / NO
Do frightening thoughts keep coming back in your mind?	...	...	...	...	...	...	...	...	...	YES / NO
Does every little thing get on your nerves and wear you out?	...	...	...	...	...	...	...	...	...	YES / NO
Do you often get spells of complete exhaustion or fatigue?	...	...	...	...	...	...	...	...	...	YES / NO
Do you suffer from severe nervous exhaustion?	...	...	...	...	...	...	...	...	...	YES / NO
Are you considered a nervous person?	...	...	...	...	...	...	...	...	...	YES / NO
Do you usually feel unhappy and depressed?	...	...	...	...	...	...	...	...	...	YES / NO
Does life look entirely hopeless?	...	...	...	...	...	...	...	...	...	YES / NO
Do you often wish you were dead and away from it all?	...	...	...	...	...	...	...	...	...	YES / NO

WE THANK YOU FOR
COMPLETING THIS QUESTIONNAIRE
PLEASE RETURN TO THE RECEPTIONIST

PART II. SCREENING

PHYSICAL MEASUREMENT

Height: ft. ins. (to nearest $\frac{1}{2}$ " below)

Weight: st. lbs. (to nearest pound below)

Observer (Ht. & Wt.)

convert to inches ins.

convert to pounds lbs.

TESTS OF VENTILATORY CAPACITY

Observer (ventilatory capacity)

Instrument Number

(1) Peak Expiratory Flow Rate

1. 2. 3.

4. 5.

Mean of 3, 4, 5
(Men 350 litres per minute
Women 300 litres per minute)

(2) One-Second Forced Expiratory Volume

(Corrected to BTPS)

Instrument Number

1. 2. 3.

Mean of 2 and 3 to two decimal places
(Men 2.5 litres per minute
Women 2.0 litres per minute)

(3) Forced Vital Capacity

(Corrected to BTPS)

1. 2. 3.

Mean of 2 and 3 to two decimal places

VISION

Observer ☐ ☐

Distant Near

Glasses normally worn

Tested with glasses

(a) Snellen's Chart (with glasses if normally worn)

Right Left

With pin hole lens (if vision is less than 6/18)

Right Left

(b) Near Vision (with glasses if worn for reading)

Right Left

(c) Field Screening

F/S:

R. eye: Normal/Failed

L. eye: Normal/Failed

Observer ☐ ☐

Instrument Number ☐ ☐

HEARING

Observer ☐ ☐

Instrument Number ☐ ☐

Audiometer sweep at 30 db loss:—

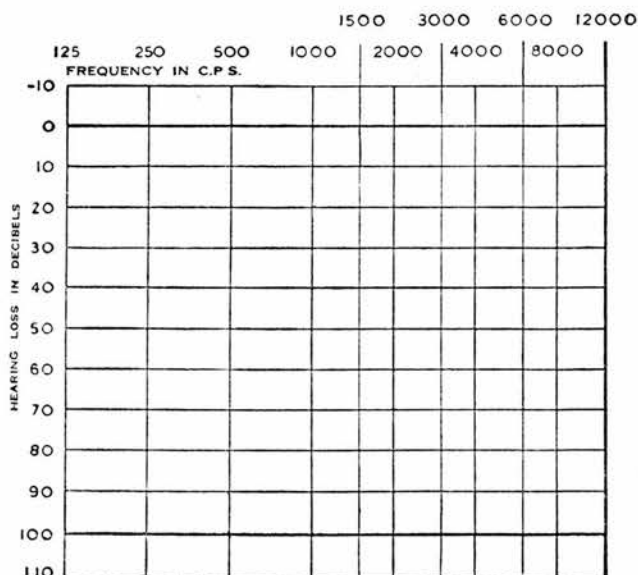
Right: NORMAL / FAILED (note not heard on two occasions)

Failed frequencies c/s c/s c/s

Left: NORMAL / FAILED (note not heard on two occasions)

Failed frequencies c/s c/s c/s

Audiogram—if two or more failures at 30 db loss in one ear



RIGHT = O AIR = —

LEFT = X BONE = ---

BS OR AMA STANDARD

SKINFOLD

Observer

(Skinfold—mm to 1 decimal place)

Triceps: 1st reading

2nd reading

Subscapular: 1st reading

2nd reading

BLOOD PRESSURE

(Observer (blood pressure)

Instrument Number

	Reading 1		Reading 2		
	Raw	Corrected	Raw	Corrected	
Systolic					Mean <input type="text"/> <input type="text"/> <input type="text"/>
Diastolic 1					Mean <input type="text"/> <input type="text"/> <input type="text"/>
Diastolic 2					Mean <input type="text"/> <input type="text"/> <input type="text"/>
Correction					

E.C.G.

Observer

Minnesota Code:

Reader , Code

Reader , Code

Arbitrator (Dr.)

Interpretation (Dr.)

LABORATORY RESULTS

Time after last meal minutes

Time of last meal

Blood: Sequestrene Universal 1

Flouride Universal 2

Blood Urea 50 mg. %

Random	
Blood Sugar	150 mg. %

Uric Acid 6 mg. % (F)
 7 mg. % (M)

Serum Cholesterol	300 mg. %
-------------------	-----------

P.B.I. (4-8mg.) mg. %

Occult Blood

CHEST X-RAY

X-ray Number

Report: NORMAL / ABNORMAL